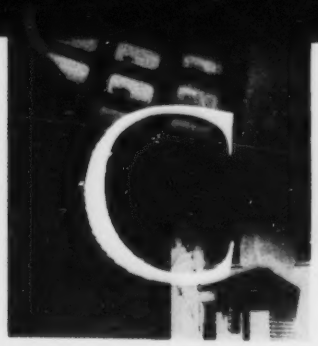
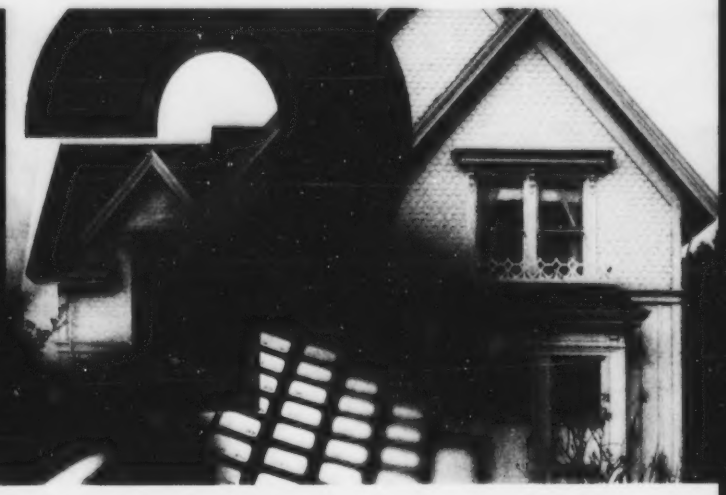


CURRENT HOUSING RESEARCH

Volume 6, No. 2-3
Autumn 1999

SOCIAL, ECONOMIC AND TECHNICAL RESEARCH



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CURRENT HOUSING RESEARCH

Volume 6
Number 2-3
Autumn, 1999

Issued also in French under the title: ***Recherches courantes sur l'habitation***

Publié aussi en français sous le titre: ***Recherches courantes sur l'habitation***

CURRENT HOUSING RESEARCH ORDER FORM

If you wish to receive any of the completed reports or bibliographies listed, or if you would like to be on the mailing list to receive *Current Housing Research*, please fill out this form and send it to:

Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa ON K1A 0P7
Fax (613) 748-4069
Telephone 1-800-668-2642
Email: chic@cmhc-schl.gc.ca

Completed Reports Requested

Bibliographies Requested

☐ Send copies of above reports/bibliographies

☐ Add my name to your mailing list to receive *Current Housing Research*

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INTRODUCTION

Welcome to "*Current Housing Research*". This publication merges "*Housing Research Quarterly*" and "*Current Housing Technology Initiatives*" and continues the numbering of the "Housing Research Quarterly".

Under Part IX of the National Housing Act the Government of Canada provides funds to Canada Mortgage and Housing Corporation to conduct research into the social, economic and technical aspects of housing and related fields.

Current Housing Research is compiled and produced three times a year by the Canadian Housing Information Centre. This publication provides information and access to research which is undertaken and sponsored by the Corporation. It is also available on CMHC's Website at chic@cmhc-schl.gc.ca

The publication contains information on completed research reports, new publications, videos and bibliographies, as well as planned and ongoing research projects. An alphabetical title index of items listed is included at the end for quick reference.

The overall arrangement of "*Current Housing Research*" is by broad subject category. Within each subject category, lists of planned and ongoing projects and completed research reports are described.

Each entry can contain the following elements:

- The project or report title;
- A description of the project or report results;
- The CMHC Project Officer who is managing the project;
- The Division within CMHC which is responsible for the project;
- For External Research Projects, the grant recipient undertaking the research;
- A Contract Identification Number (CIDN);

- The Status of the project: whether the project is in a planned, ongoing or completed phase. "Planned Projects" are those that are not yet underway, but are likely to be initiated in the current year. "Ongoing Projects" refer to research projects which are currently underway. No reports are yet available. Once the project is completed, and a report is available for distribution, it will be listed as a "completed report."

- Whether the report resulting from the research project is available and the address where the completed report can be obtained.

To discuss research projects that are recent or ongoing, please call CMHC General Inquiries at (613) 748-2000 and ask for the CMHC Project Officer identified under each project description.

CMHC's External Research Program

The objective of the CMHC External Research Program (ERP) is to encourage and enable researchers in the private and not-for-profit sectors to put forward and carry out relevant, innovative, and high quality housing research projects. Under the Program, financial contributions are made to support research investigations into important questions, problems, and issues affecting Canadian housing. Housing research priority areas are identified in the "External Research Program Grants for Housing Research Guidelines and Application Form".

Applicants to the External Research Program must be Canadian citizens or have permanent resident status in Canada.

Independent researchers as well as those employed in Canadian universities, institutions, private consulting firms, the professions and the housing industry may apply for these grants.

Full-time students at the graduate or undergraduate level are not eligible to apply. Students may be hired to assist in the conduct of the research, but under no circumstances may they take over responsibility for the direction of the work or the quality of the final report.

Individuals who are full-time federal, provincial or municipal government employees may apply. However, to be eligible, an applicant must provide a letter of support from her/his employer which shows that the proposed research is not part of, and will not interfere with, her/his regular work. CMHC employees are not eligible to receive grants under this Program.

CMHC is interested in receiving applications on topics related to its housing research priority areas. New ideas and innovative approaches in these areas are welcome.

To obtain the booklet outlining the priority research areas, the guidelines and application form for the External Research Program you may contact:

The Administrator
CMHC External Research Program
Research Division
Canada Mortgage and Housing Corporation
700 Montreal Road, Room C7-307
Ottawa, Ontario
K1A 0P7

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NOTE TO INTERNATIONAL CLIENTS

The *"Current Housing Research"* cites research reports and priced publications. **Availability and place of ordering varies with the type of report.**

PRICED PUBLICATIONS

Publications with prices listed in the *"Current Housing Research"* are available for sale to international clients. Prices are payable in Canadian dollars. Orders can be placed and the exact price, with shipping and handling, can be obtained from the following address:

CMHC Information Products
P.O. Box 35005
Stn BRM B
Toronto, Ontario
M7Y 6E5
Tel.: 613-748-2003
Fax: 613-748-2016

RESEARCH REPORTS

Research reports are listed without a price in the *"Current Housing Research"*. They are free to Canadian residents. However, to recover some of our distribution costs there is a fee to mail research reports to locations outside of Canada. The price for research reports mailed to destinations in the United States is $10.00 for each report. The price for research reports mailed to destinations in other countries is $15.00 for each report. Prices are payable in Canadian dollars. Research reports can be ordered from the address listed below:

Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367
Fax.: 613-748-4069
Internet: chic@cmhc-schl.gc.ca

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TECHNICAL RESEARCH

EVALUATION OF THE HOUSING INTERNSHIP INITIATIVE FOR FIRST NATIONS AND INUIT YOUTH

The purpose of this project is to undertake an evaluation study of the housing Internship Initiative for First Nations and Inuit Youth administered by CMHC as part of the federal government Youth Employment Strategy.

CMHC Project Officer : *Denys Chamberland* — ***CIDN*** : *2082 0500001*
Division : *B.C. & Yukon Business Centre* — ***STATUS*** : *Ongoing Project*
AVAILABILITY : *Publication is not available*

NATIVE TECHNICAL TRAINING - DEVELOPMENT OF TRAINING MODULES

The objective of this project is to provide a set of new and revised technical training materials to facilitate future CMHC and First Nations-sponsored builder training sessions.

CMHC Project Officer : *Tom Kerwin* — *CIDN* : *1750 0300002*
Division : *Research Division* — *STATUS* : *Ongoing Project*
AVAILABILITY : *Publication is not available*

PARTICIPATORY PLANNING PROCESSES WITHIN FIRST NATIONS COMMUNITIES

This project's purpose is to carry out the research project entitled "Participatory Planning Processes Within First Nations Communities".

CMHC Project Officer : *Raymond W Bursey* — *CIDN* : *2144 0200012*
Division : *Research Division* — *STATUS* : *Ongoing Project*
AVAILABILITY : *Publication is not available*

IMPACT DU BRUIT INDUSTRIEL SUR LES SECTEURS RÉSIDENTIELS ENVIRONNANTS: PORTRAIT DE LA SITUATION POUR LA BEAUCE ET POUR LA RÉGION DE QUÉBEC, ANALYSE DES LOCALISATIONS PROBLÉMATIQUES ET RECOMMANDATIONS

Residential sectors can be adjacent to sectors that are classified as commercial or industrial but, in many cases, the two functions are not compatible, whether on account of intense trucking activity, sporadic noise throughout the day or even continuous noise that can last well into the night. There are many complaints in this regard, in both urban and rural areas. Planners and legislators are generally powerless to resolve this issue. In existing conflict situations, both functions are well within their rights, that is, residents can demand peace and tranquillity, while industrialists can expect to work and operate their companies, without having any new constraints imposed on them. As for potential situations, in the case of new residential developments, for example, there is not always an in-depth environmental analysis, or else, the pressure from developers wins out over the viewpoints of planners and environmentalists.

In this context, the research project proposed to establish the situation regarding the impact of industrial noise using as its laboratory the Québec and Beauce areas, two areas that comprise numerous industrial parks adjacent to residential sectors. The Beauce area, in addition to its very active industries, has a topography that is conducive to the concentration of urbanization and human activities. The principal objectives of the project were as follows:

- establish the scope of the problem of the impact of industrial noise on the closest residential sectors;
- measure and map the noise in the residential sectors deemed the most critical (with special consideration given to industries operating 24 hours a day);
- verify the causes of the situations analyzed (uncontrolled growth of residential developments, poor industrial planning or indifference of the industrial sector);
- identify the provincial and municipal legislative situation;
- analyze the possible mitigating actions (in particular, using computer modelling), such as reducing or controlling the level of noise at the source, or introducing protective measures, which could potentially include landscaping; and, finally,
- compile the results in a regional perspective, for both the survey of the situation and the recommendations.

Among all the industrial zones and parks visited, 15 sites were retained and analyzed in the Beauce area and 27 in the greater Québec area. The research project made it possible to document and clarify an often neglected aspect of residential environment quality and also to propose a few avenues for more sustainable solutions, to the attention of planners, industrialists, municipalities, and even developers.

Prepared by Jean-Gabriel Migneron, Pierre Côté, Wu Weixion. CMHC Project Officer: Sandra Marshall. Ottawa: Canada Mortgage and Housing Corporation, 1998. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road, Ottawa, Ontario, K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642, Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

SOUND AND FIRE PERFORMANCE OF FIRE STOPS IN MULTI-FAMILY DWELLINGS: FLANKING TRANSMISSION AT JOINTS IN MULTI-FAMILY DWELLINGS: PHASE I: TRANSMISSION VIA FIRE STOPS

Fire stops can introduce a physical connection between the two sides of a double-stud wall, hence providing structural flanking paths for transmission of vibration which worsens the sound insulation.

This study primarily addressed the specific case of a load-bearing party wall with double wood studs, supporting a floor with wood joists perpendicular to the party wall and a floor deck or sub-floor of 15.9 mm OSB.

Even without structural transmission of vibration through a fire stop, the sound insulation in a real building is normally affected by flanking transmission.

Addition of a fire stop provides yet another path for vibration transmission between the rooms, and hence tends to worsen the sound insulation further. This study examines how a fire stop at the floor/wall junction can degrade the apparent sound insulation of the party wall (the nominal separation) by increasing structural transmission of vibration around that wall via the connected floor system (the flanking path).

Prepared by T.R.T. Nightingale, R.E. Halliwell, Institute for Research in Construction, National Research Council. Prepared for: Canada Mortgage and Housing Corporation ... et al. CMHC Project Officer: Jacques Rousseau. Ottawa: CMHC, 1997.

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

BASEMENT WALLS THAT DRY: FINAL PROJECT REPORT

An eighteen month study was undertaken to evaluate the abilities of 10 basement wall insulation/framing options to dry after being subjected to either a controlled leak or a short term flood. Conventional wood framed construction, steel stud construction and three proprietary systems were evaluated. The proprietary systems included a new product from Owens Corning which is a vinyl faced rigid fibreglass system which can be installed without wood or steel framing, an extruded polystyrene insulation system, Perimate from Dow and a sprayed in place polyurethane insulation. Five variations of conventional wood stud framing were evaluated. The differences evaluated ranged from the use of an external moisture barrier to standing the framing off walls and floors to the use of Densglas as an alternative to gypsum board. The two steel stud systems tested varied only in stand off from the basement wall.

In general all of the proprietary wall systems performed better that the wood framed or steel stud systems. The systems either did not absorb significant amounts of moisture or dried relatively rapidly after wetting. This was observed whether the moisture source was a controlled leak or a short term flood.

The steel stud stystems performed better than their wood framed counterparts when subjected to a short term flood. The steel studs, having no capability to retain moisture, dried out more quickly than the wood systems.

Of the wood framed systems tested none appeared superior in both cases; controlled leak or flood. In the case of a controlled leak, such as might occur in the event of a crack in a basement wall, the systems that had an external moisture barrier caused the water to flow down the wall, under the bottom plate and into the basement. Because such system systems were never really wetted they appeared to offer superior performance. When the source of the moisture was a flood the opposite appeared to be true. It was not possible to "seal" the panels, nor was any real attempt made to do so. When standing in 100 mm of water during a "flood" the liquid found its way into all panels, regardless of whether a moisture barrier was present. Once in the panel the moisture remained longer in panels equipped with a moisture barrier. In other words the moisture barrier inhibited moisture removal.

Aside from some darkening in the bottom plate of two of the wood framed panels the study was unsuccessful in producing significant growth of mold or mildew. Conditions were generally favourable; surface moisture and wood moisture contents in excess of 25% for months but no infestations occurred. This may be due to the lack of spores which must be present to initiate growth.

Prepared by Tom W. Forest and Mark Y. Ackerman. Ottawa: Canada Mortgage and Housing Corporation, 1999.

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road. Ottawa, Ontario, K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

IMPROVED BASEMENT PERFORMANCE

Concerns have been expressed by a number of authorities about the quality of construction of new basements. Technical and cost issues pertaining to the overall performance of poured-in-place concrete basements will be examined. The Canadian Standards Association (CSA), with CMHC and industry support, will improve the standard CAN3-A438-M84: Concrete Construction for Housing and Small Buildings. This standard addresses requirements for poured-in-place concrete basements. Several task groups are working to update this standard.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1259 0200001
STATUS : Ongoing Project

PERFORMANCE GUIDELINE DEVELOPMENT FOR BASEMENT SYSTEMS AND MATERIALS

CMHC is a participant contributing research to this multi-disciplinary, multi-agency study led by the National Research Council identifying knowledge gaps in the performance of basement systems. Guidelines will be developed for design, construction and evaluation of basement materials and systems to ensure their durability and long-term performance. Field work is largely complete. The reports on various aspects are being written.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1421 0200001
STATUS : Ongoing Project

SLIDE PRESENTATIONS ON TWO FOUNDATION TYPES AND TO MONITOR THE PERFORMANCE OF THE EXAMPLES OF THE TWO FOUNDATION SYSTEMS

The purpose of this project is to undertake and complete the development of two slide presentations and the monitoring of two foundations over a one-year period. The slide presentations will be integrated into the First Nations builder training curriculum materials.

CMHC Project Officer : *Tom Kerwin*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1813 030000
STATUS : Ongoing Project

AUSTRALIAN BUILDING REGULATORY REFORMS

To conduct further research into Australian building regulation and liability reforms by documenting the Australian experience with the reforms to date, examining the issues encountered with respect to the application of the reforms to the housing sector. The Commonwealth Government of Australia and individual Australian states have introduced reforms to the regulatory environment in order to reduce costs and barriers associated with development and construction. Some of the reforms include a transition to objective based building codes, the introduction of compulsory job-specific warranty-type insurance programs, limitations on liability for building practitioners, privatization of building approvals and inspections and compulsory registration of building professionals. This project documents the reforms implemented in the State of Victoria based on a review of documentation and regulations and interviews with key actors. The status of similar reforms in other states and territories is reported. A draft report has been received and is being reviewed for publication in the fall of 1999.

CMHC Project Officer : *Mark Holzman* — *CIDN : 2185 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

FUTURE OF CANADIAN STANDARDS FOR RESIDENTIAL CONSTRUCTION

The objective of this project is to build on the March/97 report of the Joint Task Force of the Canadian Commission on Building and Fire Codes/Provincial/Territorial Committee on Building Standards (PTCBS/CCBFC) by documenting recent changes in standards specifically related to the housing industry, describe the role and importance of standards in the housing industry and examine the issues and implications for various futures of each category of the standards.

CMHC Project Officer : *Doug Pollard* — *CIDN : 2027 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

ADJUST-A-FORM

The objective of this project is to develop ideas for adjustable, reusable forms. Specifically the project includes the inception to the development of a specific product ready for marketing. The end result will be a product that saves builders time and material and therefore project costs.

CMHC Project Officer : *Darrel Smith*
Division : *Research Division*
Housing Technology Incentives Program
AVAILABILITY : *Publication is not available*

CIDN : 1501 0200001
STATUS : Ongoing Project

BUILDING AND RENOVATING WITH SALVAGED MATERIALS: A REUSE WORKPLAN

The objective of this project is to develop and test design procedures and specification guidelines in the form of a workplan by which design professionals and builders can effectively salvage and reuse materials in building projects including demolition and renovation or new construction at a residential scale.

CMHC Project Officer : *Darrel Smith*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2023 0200001
STATUS : Ongoing Project

COMPRESSED EARTH BLOCK CONSTRUCTION

The objective of this project is to officially approve the material "earth", to allow architects, builders and self-builders to make use of earth construction.

CMHC Project Officer : *Chris Ives*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2004 0200001
STATUS : Ongoing Project

DURABILITY AND SERVICE LIFE OF MULTI-UNIT RESIDENTIAL BUILDING ELEMENTS AND EQUIPMENT

A Delphi study is currently underway to collect information from property managers, property management firms and experts in differing fields such as ventilation systems, elevators, walls, parking garages, etc., to determine, from their experience, the service life of these elements. The study is expected to provide data on building elements which in some cases would have low or high durability variances. Follow-up research could then be undertaken to investigate why those building elements have these high variances.

CMHC Project Officer : *Ken Ruest* — *CIDN : 1915 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

PERFORMANCE OF PLASTIC AND COMPOSITE MASONRY TIES

The purpose of this project is to investigate the possibility of the alternative material (plastics or composites) application to masonry ties. Detailed research to determine what has been done in the field of masonry ties around the world will be investigated, followed by the evaluation of the information.

CMHC Project Officer : *Luis de Miguel* — *CIDN : 2144 0200020*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RE-USE: INTEGRATION OF USED BUILDING MATERIALS INTO NEW CONSTRUCTION

The objective of this project is to promote the practice of re-use of building materials as a viable approach in the 3Rs of sound environmental practice for the construction industry, presently including waste management through recycling and reduction. Research will address 4 main concerns: economic, environmental, legislative/practical and perceptual -- presently barriers to viability in practice.

CMHC Project Officer : *Darrel Smith* — *CIDN : 1842 0200001*

Division : *External Research Program*
Research Division — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

THE MACROECONOMIC IMPACT OF THE BUILDING MATERIALS INDUSTRY IN CANADA

Using input-output (I-O) data and a well-known macroeconomics model of the Canadian economy, this study estimates the economic impact of the Canadian building materials industry in terms of national income and employment for the years 1995 and 1989. The study covers sub-industries producing:

- gypsum, wallboard and accessories;
- plumbing fixtures and fittings;
- windows and doors;
- roofing;
- insulation and air barriers;
- heating and air conditioning systems;
- exterior cladding;
- flooring;
- concrete products;
- ready-to-use lumber;
- paints and related products;
- textile floor coverings;
- kitchen cabinets; and
- floor and wall coverings, excluding vinyl.

For each sub-industry, impacts are broken down into:

- direct impacts, occurring within the sub-industry itself;
- indirect impacts, occurring in industries that supply the sub-industry with raw materials and other inputs; and
- induced impacts, generated throughout the economy as households spend income earned as a result of direct and indirect impacts.

Prepared by Geoff Bromfield, Martha Justus, Keith May, Informetrica Limited. Ottawa: Canada Mortgage and Housing Corporation, 1999. (Housing Affordability and Finance Series: Research Report)

*Order number: PE0325 **Price: $12.95 + GST and handling charges.*

STATUS : Completed Report

AVAILABILITY : *CMHC Information Products*
P.O. Box 35005, Stn BRM B
Toronto, Ontario M7Y 6E5
1-800-668-2642
Fax orders from Canada: 1-800-245-9274
International clients see page 9 for order instructions.

DEVELOPMENT OF A NEW EDITION OF THE STANDARD FOR CONCRETE CONSTRUCTION FOR HOUSING AND SMALL BUILDINGS (CSA A438)

The purpose of this project is:

- to carry out a review of the literature pertaining to current failures of concrete in residential basements, specifically addressing the high incidence of foundation wall cracking and water penetration.

- to determine how the delivered ready-mix might be improved in crack-resistance and how on-site concreting practices might be remedied; and

- to bring standard A438 into line with the requirements of the 1994 edition of CSA 23.1 Standard Concrete Materials and Construction.

CMHC Project Officer : Don Fugler

Division : Research Division

AVAILABILITY :
Publication is not available

CIDN : 1259 0200001

STATUS : Ongoing Project

INVESTIGATION AND REPAIR STRATEGIES FOR CONCRETE CONSTRUCTION AND CATALOGUE OF INNOVATIVE CONCRETE ASSESSMENT AND REPAIR TECHNOLOGIES

The purpose of this project is to create a survey questionnaire on concrete assessment, repair and monitoring strategies and report on existing protocols regarding concrete problems in multi-unit residential buildings.

CMHC Project Officer : *Silvio Plescia*

Division : *Research Division*

AVAILABILITY : *Publication is not available*

CIDN : 1890 0200002

STATUS : Ongoing Project

CONCRETE

STANDARDIZATION OF CONCRETE REPAIR PROTOCOLS

This project will research current assessment, monitoring and repair strategies for concrete repair. Existing protocols commonly used in the field as well as existing protocol guidelines assembled by various agencies (eg. CSA) will be catalogued. This research will provide consultants, contractors and building owners with available protocols and concrete repair strategies.

CMHC Project Officer : *Silvio Plescia*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1890 0200002
STATUS : Ongoing Project

CONSUMER PROTECTION

ISSUES PAPER ON LIABILITY IN HOUSE CONSTRUCTION

The Canadian Home Builders Association (CHBA) has expressed a concern that, in housing construction, it is becoming less clear who is liable for specific aspects relating to the house. They also are concerned that, as a result of cutbacks, municipalities are not carrying out inspections to the extent they once did and may be losing the capacity to properly enforce building regulations. This joint project, co-funded by CMHC and CHBA and managed by CHBA, will produce a paper discussing the issue of liability in housing construction across Canada and identify who is and is not liable. It will serve as the basis for discussion on these issues and for further study. The National Research Council (NRC) will also be a participating partner as the agency responsible for code development. An initial draft was prepared and the project was extended to include provincial consultations at CHBA's request.

CMHC Project Officer : *Mark Holzman*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1920 0200001
STATUS : Ongoing Project

CONSUMER PROTECTION

OVERVIEW OF CONSUMER PROTECTION FOR HOUSING IN CANADA

For most Canadians buying a house is the largest financial expenditure they are ever likely to make. On an ongoing basis, housing represents a major component of household expenditures whether for mortgage or rent payment, maintenance and repairs or renovations and improvements. Canadian consumers have increasingly expressed concerns about dealing with the home building and renovation industry. These concerns have contributed to low consumer confidence in the housing industry, as measured by various public opinion research. Builders and contractors have also expressed concerns regarding issues of liability with respect to housing construction deficiencies and operating problems. New home warranty programs exist to provide some protection for purchasers of new housing but vary in terms of time limits, eligible components and financial limitations. This study will provide an overview of the context and issues surrounding consumer protection for housing in Canada. Information will be collected to produce an inventory of available programs, initiatives and activities addressing consumer protection including warranty programs, inspection services, consumer information products, training activities, etc.

CMHC Project Officer : *Mark Holzman* — *CIDN : 2135 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CONTAMINATED LANDS

DEMONSTRATION OF SAFE HOUSING ON LIGHTLY CONTAMINATED LANDS

CMHC research into contaminated lands shows that some types of soil contaminants could be rendered innocuous through building design and operation. One example is heavy metals deep within the soil. If these pollutants can be avoided through design, the cost of land remediation could be greatly reduced. The project will include contaminant monitoring and the investigation of the predictive capabilities of site specific risk assessments.

CMHC Project Officer : *Don Fugler* — *CIDN : 1946 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CONTAMINATED LANDS

EVALUATION OF SITE SPECIFIC RISK ASSESSMENTS FOR HOUSES

The objective of this project was to assess the accuracy, reproducibility, and utility of site specific risk assessments for houses. A description of a hypothetical contaminated site was submitted to nine risk assessment consultants and they provided "screening level" assessments on the health risks experienced by residents of houses built on that site. The risk assessments varied widely, by several orders of magnitude. A research report has been issued on the work. It discusses how the consultants differed in their risk assessments, the source of the assessment variation, and how the assessments could be improved.

The final task is for the contractor to submit an article on project findings to a peer-reviewed journal on risk assessment.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1534 0200002
STATUS : Ongoing Project

DOORS AND WINDOWS

DESIGN OF DURABLE JOINTS BETWEEN THE WINDOWS AND THE ENVELOPE

The objective of this project is to establish construction, parameter and calculation method concepts to improve the durability of joints between walls and windows.

CMHC Project Officer : *Jacques Rousseau*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1839 0200001
STATUS : Ongoing Project

INFLUENCE OF AIR INFILTRATION ON THE ENERGY EFFICIENCY OF RESIDENTIAL WINDOWS

The objective of this project is to propose a new way of accounting for air infiltration in energy efficiency calculations for windows.

CMHC Project Officer : *Ken Ruest*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2002 0200001
STATUS : Ongoing Project

ASSESSING THE ENERGY IMPACT OF VENTILATION AND INFILTRATION IN MULTI-UNIT RESIDENTIAL BUILDINGS: FIELD INVESTIGATION OF ENERGY IMPACT OF CORRIDOR AIR VENTILATION SYSTEMS

A research project has been initiated to study the seasonal impact of the operation of corridor air ventilation systems in multi-unit residential buildings on heating season energy consumption. Traditionally, it was assumed that corridor air systems should be shut down during periods of low occupancy and/or occupant activity in order to reduce energy consumption. However, it is also suspected that shutting off a natural gas-fired corridor air system in an electrically heated building, may actually increase energy consumption. Both of the aforementioned assumptions are based on the theory that corridor air systems are capable of effective and efficient air delivery - which is now known to be incorrect. The research will attempt to determine the influence that the operation of corridor air systems within 4 buildings has on energy consumption. The systems will be cycled on and off over a sufficient period to allow for an analysis of trends in resultant energy consumption. This study will help to characterize the costs of operating corridor air systems and will also serve to identify energy efficiency strategies.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1934 0200004
STATUS : Ongoing Project

CMHC EMPTIED HEAT, AIR AND MOISTURE TRANSPORT MODELLING PROGRAM

The purpose of this project is to provide engineering services to upgrade the CMHC EMPTIED Program from a DOS to Windows environment and to compile the necessary weather data to allow the program to evaluate the performance of wall systems in major cities of the U.S. and Canada

CMHC Project Officer : *Silvio Plescia*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1107 0300003
STATUS : Ongoing Project

ENERGY EFFICIENCY CASE STUDIES OF MULTI-UNIT RESIDENTIAL BUILDINGS

CMHC is in the process of documenting the application of energy efficiency measures in multi-unit residential buildings to be used as case studies. A trial case study of a housing co-operative in Ottawa is underway, to not only assess the strengths and weaknesses of the energy efficiency measures implemented, but also to identify what information can be disseminated to others in the building industry. Upon completion of this first case study, CMHC will be soliciting the housing industry for additional energy efficiency case studies. A compendium of case studies will be made available from CMHC. The case studies will also support the Energy Efficiency Opportunities Manual for Multi-Unit Residential Buildings that CMHC is in the process of developing.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1899 0200002-3
STATUS : Ongoing Project

ENERGY EFFICIENCY OPPORTUNITIES MANUAL FOR MULTI-UNIT RESIDENTIAL BUILDINGS

CMHC, in partnership with the Ontario Ministry of Municipal Affairs and Housing (OMMAH), is in the process of developing a manual that details energy efficiency measures for existing multi-unit residential buildings. The document will be based on one originally developed by the Ontario Ministry of Housing in the early 1980's. The new manual will offer proven, current energy efficiency measures for the building envelope, mechanical, electrical, and domestic hot water heating systems. A project steering committee consisting of members of the housing, utilities and government agencies has been formed to provide comment on the manual as it is developed. The manual will be modularized and provided in a format that will be easily updated over time.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1887 0200002
STATUS : Ongoing Project

EVALUATION OF EMBODIED ENERGY FOR THE CONSERVATION CO-OPERATIVE

The objective of this project is to complete the evaluation of embodied energy for the Conservation Co-operative case study documentation.

CMHC Project Officer : *Sandra Marshall*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1817 0300002
STATUS : Ongoing Project

FOUNDATION PAPER ON COMMUNITY ENERGY PLANNING

Following the recent Kyoto summit on climate change, the federal government recently established fifteen "Issue/Sector Tables" to examine the costs and impacts of implementing Canada's greenhouse gas reduction targets. CMHC is a member of the "Municipalities Table" and co-chairs the subcommittee on "Community Energy Planning" (reporting to the Municipalities Table). CMHC recently funded the development of a Foundation Paper on Community Energy Planning to examine the potential energy savings and greenhouse gas emission reductions associated with integrated transportation and land-use planning, community energy systems (cogeneration, district heating, etc.), and other energy management options.

CMHC Project Officer : *Brian Eames*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2078 0200001
STATUS : Ongoing Project

INTERNATIONAL ENERGY AGENCY (IEA) : ENERGY RELATED ENVIRONMENTAL IMPACT OF BUILDINGS

This four-year project, scheduled to end in 2000, is an IEA activity in which 14 countries are collaborating in the development of life-cycle energy modelling. Information will be compiled and published on the methodology and life-cycle environmental impact data. Examples will be developed of how methods may be applied to different building types and sources of expertise, with the potential for extending the influence of the task directly into academia. CMHC is acting as the Operating Agency for this project.

CMHC Project Officer : *Thomas Green*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1629 0200002
STATUS : Ongoing Project

LABORATORY TESTING OF DENSE PACK CELLULOSE FOR ATTIC INSULATION

Some insulators claim that dense packing of cellulose insulation into hard to reach cavities (e.g. flat roof attics) prevents air movement along with providing insulation. Hydro Québec looked at the technique for upgrading attic insulation of flat roof housing, largely in Montreal. CMHC and the Société d'habitation du Québec (SHQ) also contributed funds to this project. The field work is complete. CMHC is discussing with Hydro Québec ways of publishing the report or a condensation of its findings.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1377 02010001
STATUS : Ongoing Project

MÉTHODE D'ESTIMATION ÉNERGÉTIQUE DES BÂTIMENTS D'HABITATION BASÉE SUR L'APPLICATION DE L'INTELLIGENCE ARTIFICIELLE

The objective of this project was to develop a rapid method of estimating energy use in highrise residential buildings, by the application of artificial intelligence. The method gives a variety of results, such as total energy consumption, power load, heat and cooling consumption, and takes into consideration such variables as apartment orientation, occupancy schedules, and the interaction of HVAC and envelope systems.

The work consisted of:

- Creation of data bases which classify the parameters of the energy simulations, modeling and validation of the results using DOE-2;
- Application of neural networks including training and validation of the results;
- Development of the simulation for residential buildings; and
- Validation of the simulation program.

The program at this stage has been developed for climatic conditions similar to Ottawa, which will be expanded at a later stage. It was tested to verify its accuracy using a previously monitored Ottawa highrise. It provides the total building energy consumption as well as the use by apartments, corridors and parking, with the power loads. The data entry and results interfaces can be modified as well. The program was developed using the MatLab environment: for a larger application, the program would need to be translated into C++ language.

Prepared by Stanislaw Kajl and Marc-Antoine Roberge. CMHC Project Manager: Sandra Marshall. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : Completed Report

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OPTIMIZE: A METHOD FOR ESTIMATING THE LIFECYCLE ENERGY AND ENVIRONMENTAL IMPACT OF A HOUSE

This computer program estimates the lifecycle energy requirements of a house as well as determining associated emissions. The program has been revised from a spreadsheet to a database to improve the instructions and user interface, and the computational speed. The application of the program is being expanded to include multiple, non part 9 national building code residential buildings by using Optimize to assess the lifecycle energy performance of the Conservation Co-op building in Ottawa.

CMHC Project Officer : *Thomas Green* — *CIDN : 0865 0201002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

PREPARATION OF AN EXECUTIVE OVERVIEW OF THE R-2000 HOME SYSTEM

The purpose of this project is to develop a comprehensive overview of the R-2000 housing system.

CMHC Project Officer : *Sylvain Lasnier* — *CIDN : 1550 0900002*

Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RE-INSULATING WITHOUT ANY CONDENSATION PROBLEMS - EFFECT OF ADDING INSULATION ON THE DISPERSAL OF EXFILTRATING AIR.

The objectives of this project are: 1. To test a method of characterizing air exfiltration, experimentally and analytically. 2. To determine the impact of two insulation strategies - from inside and from outside - on the dispersal of exfiltrating air through various types of joints.

CMHC Project Officer : *Sandra Marshall* — *CIDN : 1853 200001*

Division : *External Research Program, Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RENTAL STOCK ENVELOPE SURVEY

The STAR Database, used for modeling Canadian housing performance, requires data from a representative number of rental houses. This project looked at rental housing stock to see how it differs from owner-occupied stock and examined how rental stock could be suitably sampled for inclusion in the STAR Database. The findings show that rental stock does differ significantly from owner-occupied stock and that STAR needs to be upgraded if it is to represent rental stock. The contractor estimated that data on an additional 175 to 200 houses would be required. Options for obtaining this data are being considered.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication will not be published*

CIDN : 1766 0200002
STATUS : Completed

UPDATING THE AIRTIGHTNESS TESTING STANDARD

The airtightness testing standard, Canadian General Standards Board (CGSB) 149.10, was published in 1986 and requires updating and simplification. CMHC has engaged CGSB and a contractor to undertake this work in 1998/99. A draft standard has been submitted to CMHC for review and detailed appendices are being rewritten prior to sending the standard out for ballot.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1971 0200001
STATUS : Ongoing Project

VENTILATION IN 2 OR 3 UNIT MULTI-FAMILY BUILDINGS BEFORE AND AFTER WEATHERIZATION

This project will provide insight into how energy retrofits affect the performance of the house as a system for 2 or 3 unit multi-family buildings. This study will characterize the known air leakage performance of 2 -3 storey walk up apartment buildings. A computerized air flow model will be used to evaluate how changes in airtightness will potentially affect indoor air quality indicators.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200018
STATUS : Ongoing Project

COSTS AND BENEFITS TO MUNICIPALITIES OF MANDATORY RESIDENTIAL FIRE SPRINKLERS: SUMMARY REPORT

This report presents the results of a study to assess, from an economic perspective, the costs and benefits to municipalities of the mandatory installation of fire sprinklers in all new residential construction. The study was commissioned by Canada Mortgage and Housing Corporation (CMHC), with the participation of the Ontario Ministry of Municipal Affairs and Housing, and the Office of the Ontario Fire Marshal. The National Research Council and Federation of Canadian Municipalities were also involved in the project. In Phase 1, the economic model was developed and tested using data collected from two Ontario case study municipalities, Barrie and Burlington. Subsequently, in Phase 2, revisions to the method and economic model were made and four additional case studies were carried out. The Phase 2 case study municipalities were Edmonton, Alberta; Pitt Meadows, British Columbia; Gatineau, Quebec; and Kawacatoose First Nation, Saskatchewan.

The study examines the benefits and costs of automatic sprinklers and estimates the effect of mandatory sprinklers on the cost of providing municipal fire protection services. The study also identifies the impact of sprinklers on the cost of housing development, construction and maintenance. Municipal costs, such as potential changes in municipal infrastructure, municipal insurance premiums and fire department facilities and operations, have been considered. Development costs, such as the direct provision of infrastructure or the payment of development charges, are examined. Direct construction costs, such as the installation of the sprinkler system, and ongoing operating and maintenance costs for the homeowner, are also identified.

Prepared by: Arencon Inc. with the assistance of Clayton Research Associates Limited, Graham Harmsworth Lai & Associates Ltd., and J.G. Henderson & Associates. CMHC Project Managers: Tom Kerwin, Mark Holzman, Nicole Parent. Ottawa: Canada Mortgage and Housing Corporation, 1999, c1998. (Housing Affordability and Finance Series Research Report)

Order number: PE0314 **Price: $12.95 + GST and handling charges.

STATUS : Completed Report

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FIRE RESISTANCE TESTS ON FULL-SCALE FLOOR ASSEMBLIES

This report presents the results of 32 standard fire resistance tests conducted on full-scale floor assemblies as part of the collaborative industry-government research program investigating the effects on the fire resistance of lightweight floor assemblies of subfloor material, gypsum board screw spacing from board edges, wood-I-joist type, method of fastening the gypsum board butt ends, insulation type, number of gypsum board layers, joist spacing, resilient channel spacing, addition of concrete topping, steel/concrete composite systems and structural load.

Prepared by: M.A. Sultan, Y.P. Seguin, P. Leroux, Institute for Research in Construction, National Research Council. Prepared for Boise Cascade Corporation, Canada Mortgage and Housing Corporation, Canadian Home Builders' Association ... et al. CMHC Project Officer: Jacques Rousseau. Ottawa: CMHC, 1998.

STATUS : Completed Report

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IMPACT ON LIFE RISK OF MANDATORY SPRINKLERS IN RESIDENTIAL BUILDINS

The fire risk assessment model, developed by the National Research Council of Canada (NRC), was used to assess whether an apartment building with sprinkler protection but with increased fire department response time provides a level of fire safety for the occupants equivalent to that in a building without sprinkler protection but with the current fire department response time. The NRC model is called FIRECAM™ (Fire Risk Evaluation and Cost Assessment Model). The model assesses the expected risk to life and the fire costs in a building based on the dynamic interaction of fire and smoke spread, occupant evacuation and fire department response.

In this study, a 3-storey apartment building is used as a representative building in a new development area of a municipality, where buildings may range from a single family house to a medium-rise apartment building. The expected risk to life to the occupants is assessed with and without added sprinkler protection and with two levels of fire department response: with and without new fire stations.

New development areas in five cities are used in this study. They are Barrie and Burlington in Ontario; Pitt Meadows, B.C.; Edmonton, Alberta; and Gatineau, Quebec. In each municipality, the response times of the fire department are calculated using existing fire stations and added new stations. Future stations were previously determined by the municipal fire departments to meet protection needs for projected populations. In addition, the impact of mandatory sprinklers in an existing First Nations Community, Kawacatoose in Saskatchewan, is also assessed.

The results of this study show that, using a 3-storey apartment building as a model building, the provision of sprinkler protection and a longer than normal fire department response time (i.e. no new fire stations) provides a level of fire safety better than the case without sprinkler protection but with a normal fire department response time (i.e. with new fire stations). Based on similarity considerations in fire and smoke spread and occupant evacuation between single family houses and apartment buildings, the impacts of mandatory sprinklers on the expected risk to life, obtained for 3-storey apartment buildings, are argued to be applicable to single family houses.

Prepared by D. Yung, G.V. Hadjisophocleous, N. Benichou and Q. Liu. Prepared for Canada Mortgage and Housing Corporation. Ottawa: Institute for Research in Construction, National Research Council Canada, 1999.

STATUS: Completed Report

AVAILABILITY : *Institute for Research in Construction*
National Research Council Canada
1500 Montreal Road
Ottawa, Ontario
K1A 0R6

INVESTIGATION OF SMOKE CONTROL IN HIGH-RISES BY POSITIVE PRESSURE VENTILATION

A research project has been initiated to study the use of positive pressure ventilation (PPV) systems to contain and expel smoke from high-rise buildings during a fire emergency. PPV systems have been used in the U.S. in low-rise buildings. The system consists of a portable, high velocity fan which is used by the fire department to clear smoke from buildings in order to facilitate access to the fire and to aid in occupant evacuation. Preliminary studies have been conducted in multi-unit residential buildings but not in cold climates where stack effect may continue to dominate smoke movement. The research program is the result of a joint venture between CMHC, the City of Ottawa Fire Department and the Fire Laboratory of the Institute for Research in Construction of NRC. The ability of PPV to contain and clear smoke from exitways in high-rise buildings will be evaluated at the Fire Laboratory's full scale test building under both summer and winter conditions. If successful, PPV may offer Fire Departments an effective, lower cost, life and property saving tool.

CMHC Project Officer : *Duncan Hill* — *CIDN : 1983 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

LEARN NOT TO BURN CURRICULUM FOR ABORIGINAL COMMUNITIES

The purpose of this project is to modify the Learn Not to Burn curriculum, successfully developed and used by the U.S. National Fire Protection Agency (NFPA), for usage in Canadian First Nations communities. The Aboriginal curriculum has been developed by the Assembly of First Nations, with the assistance of the NFPA, the Aboriginal Firefighters' Association and CMHC, pilot tested in several First Nations classrooms, and will be available for K-2 modules in late 1999.

CMHC Project Officer : *Alain Croteau* — *CIDN : 1719 0300001*

Division : *Assisted Housing Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SOUND AND FIRE PERFORMANCE OF FIRE STOPS IN MULTI-FAMILY DWELLINGS: FIRE SPREAD IN WALL-FLOOR JOINTS OF MULTI-FAMILY DWELLINGS

This report presents the results of 3 full-scale tests conducted at the Institute for Research in Construction, National Research Council of Canada on double stud party wall/floor joints. The assemblies were tested in a floor furnace using the CAN/ULC-S101-M89 temperature-time relationship. This study was part of a joint research project on the fire and sound flanking at the wall/floor joints in double stud wall assemblies.

Assemblies No. 1 and No. 2 were tested with various fire stop materials: semi-rigid glass and rock fibre insulation boards, sheet steel and Oriented Strand Board (OSB) placed between the joist headers, to investigate whether these materials will prevent flame spread into the upper storey cavity between studs for 15 min. Assembly No. 3 was tested, with no fire stop material in the space between the joist headers, to investigate the effect of the width of the vertical air space (12.7 mm, 25.4 mm and 38.1 mm) between insulated double-stud frames on flame spread to the upper storey cavity between studs.

Prepared by: M.A. Sultan, Y.P. Seguin, P. Leroux, Institute for Research in Construction, National Research Council. Prepared for Canada Mortgage and Housing Corporation ... et al. CMHC Project Officer: Jacques Rousseau. Ottawa: CMHC, 1997.

STATUS : Completed Report

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LE SINISTRE DE JUILLET 1996 AU SAGUENAY: CONSÉQUENCES SUR LA REDÉFINITION DE L'HABITAT

The intent of this research is to allow one to appreciate, based on a target population in the Saguenay region, the consequences of a natural disaster in the design of one's home and the role this plays in the various stages disaster victims go through when they are required to relocate involuntarily. In more specific terms, this research attempts to answer the following questions:

- What were the residential itineraries of families which were uprooted against their will as a result of the floods of July 1996?
- What modifications did those who were involuntarily located make to their homes?
- What mechanisms did these people resort to in order to integrate into their new communities?
- What decision-making strategies could be used to take into account the needs and the living experience of relocated persons?

The research strategy takes a qualitative approach which involves interviews with about forty persons or couples who lost their homes and all their personal possessions during the floods of July 1996. Two verification instruments are used to explain what has been observed - semi-directed interviews and fact sheets. The answers to the questions asked produced the following findings. In addition to the physical and psychological effects of the direct consequences of the disaster and the numerous related difficulties, several aspects of the victims' personal, family, professional and social lives changed - (a) residential itineraries (most victims relocated three or four times before taking up their current residence) were a source of major tension; (b) integration into new neighbourhoods was mainly achieved with the participation of family and friends, and the new neighbours were often left out of the process. According to the disaster victims, living in a new neighbourhood means a break or even mourning, e.g. "A separation from friends, the loss of a feeling of security, changes in lifestyle, financial constraints, etc.; (c) the loss of "this paradise (...) this great corner of the world" elicits a new definition of the housing which is marked by images or representations that are negative (feeling of strangeness, nostalgia, indebtedness, sentimental losses, etc.); (d) finally, disaster victims have some suggestions to pass on to others who suffer a similar fate to inform and guide them. They suggest that victims take a step back before they make any important decisions. If volunteers are required at all times to display an understanding and generous attitude, the various levels of government should reduce bureaucratic and administrative requirements. Another suggestion offered by disaster victims was to extend the period during which financial and psychological help would be provided.

Prepared by Danielle Maltais, Suzie Robichaud. CMHC Project Officer: Marcel Boily.

Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*

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700 Montreal Road, Ottawa, Ontario, K1A 0P7

Tel.: 613-748-2367 or 1-800-668-2642

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CHARACTERIZATION OF AIR LEAKAGE, PRESSURE REGIMES AND RESULTANT AIR MOVEMENT IN HIGH-RISE RESIDENTIAL BUILDINGS

The purpose of this project is to undertake a field investigation of the ventilation and infiltration in a residential highrise building. CMHC, in cooperation with the Institute of Research in Construction, will monitor indoor-outdoor air pressure regimes in a highrise for a period of one year. Ventilation system performance will also be assessed. Pressure regime measurements, in conjunction with measured air leakage characteristics of selected assemblies, will be used to estimate real-time air movement across the building envelope. This information will add to the body of knowledge governing infiltration-ventilation regimes and resultant heat load calculations in buildings.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1934 0200005
STATUS : Ongoing Project

CORROSION OF DOMESTIC OIL TANKS

The objective of this research project is to investigate the corrosion of domestic oil tanks. Based on the findings, a number of predictive/preventative maintenance methodologies will be developed. A further objective will be to recommend changes to the various codes and guidelines covering tank fabrication, system installation, maintenance, inspection procedures and product specification.

CMHC Project Officer : *Silvio Plescia*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200009
STATUS : Ongoing Project

EVALUATION OF RESIDENTIAL FURNACE FILTERS

Forced air furnaces are a common Canadian heating system. Traditionally, filters placed in the circulating air ductwork were designed to protect the furnace and fans. Over the last several years, there has been increased emphasis on improving the filtration efficiency with the goal of reducing occupant exposure to respirable particulate.

This project tested the performance of different filters in actual houses, from disposable fiberglass to electrostatic precipitators. The contractor looked at how air filtration affects the levels of particulates (airborne dust) in housing, and at the production of ozone by electrostatic precipitators.

Analysis shows that good filters do remove particulates at rates that are close to their rated performance. For example, the most effective filter tested, an electrostatic precipitator, reduced the quantity of particulate in the air in the duct from 70% - 90 % in different tests. But, because particulate is constantly infiltrating the house and is being created by occupant activities, the tests showed that when this very good filter was in operation, the concentration of airborne particulate in the house air was reduced only 40%. All other filters tested, being less efficient, fell in the range of less than 40% reduction. As well, these filters only work when the furnace fan is on. If the fan is not run continuously, installing good filtration will be even less effective.

A more comprehensive dust-reduction program is necessary (e.g. reducing house air leakage, better and more frequent vacuuming, reducing house particulate sources, etc.) to make a significant reduction in house airborne particulate, rather than simply increasing furnace filter efficiency. Upgrading filters is only a partial solution.

Prepared by Dara Bowser, Bowser Technical Inc. Prepared for Research Division, Canada Mortgage and Housing Corporation. CMHC Project Officer: Don Fugler. CMHC, 1999. (Housing Technology Series)

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FIELD SURVEY OF HEAT RECOVERY VENTILATION SYSTEMS

Ventilation is one of the most important design issues of the 90's in the Canadian construction industry. Building codes promote the comfort and safety of occupants by ensuring fresh air is provided to new homes, and stale, contaminated air is exhausted outdoors. Increasingly, these code requirements are being satisfied by the use of packaged heat recovery ventilators (HRVs).

Given the increased reliance on HRVs for ventilation, several authorities expressed a desire to explore and assess the relationships between home design, mechanical ventilation system design, installation practices and occupant use of ventilation systems as they relate to the effectiveness of ventilation of the dwelling. In response to such concerns, Canada Mortgage and Housing Corporation engaged Buchan, Lawton, Parent Ltd to study the field performance of HRV ventilation systems.

The conclusions drawn from these results will make it possible to improve installation practices, HRV system performance, and occupant understanding of and interaction with their HRV system.

The project involved four phases: 1) inspections of 60 homes with HRV ventilation systems, 2) survey of the occupants of the 60 households to determine their understanding and usage of their HRV ventilation systems and a telephone survey of a further 15 households, 3) intensive performance testing of existing HRV ventilation systems, and 4) intensive performance testing of experimental HRV ventilation systems.

The methodology for Phases III and IV involved the use of a trace concentration of gas to assess air change rates. Sulphur Hexafluoride, an innocuous gas not found in household environments, was released at predetermined points throughout the house and mixed by mechanical means until similar concentrations were achieved throughout the house. By measuring the decay in the concentration of the gas, the apparent air change rates were derived. The operating conditions of the ventilation system and the locations of the sampling points had an impact on the extent to which the measurements reflected whole house ventilation rates, room-by-room ventilation rates, natural air change rates caused by forces other than mechanical ventilation systems, or other factors related to ventilation, such as short circuiting within rooms, and cross contamination.

The common types of HRV installations investigated under this study (fully ducted, simplified and extended) were capable of performing well. The majority of the HRV ventilation systems were operating and were perceived to be providing a benefit to the occupants of the houses. Far greater benefits were possible, however, and considerable improvements could be made in installation practice, system performance, occupant understanding and occupant interaction with their system.

Prepared by Buchan, Lawton, Parent Ltd (Toronto & Ottawa) and Canada Mortgage and Housing Corporation. Ottawa: CMHC, 1998.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
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FIELD TESTS OF VENTILATION SYSTEMS DESIGNED TO MEET 1995 NBC

This study concerns new houses designed and built to provincial or municipal codes that require the 1995 National Building Code. Ventilation requirements in recent Canadian building codes have become more complex and problematic to builders. The ventilation design needs to balance fresh air and exhausting air, and to consider house depressurization factors. The research team performed air testing on forty-one new houses in the western provinces, the North, and the Maritimes to verify their compliance with code required ventilation. No houses complied with all appropriate codes and standards; many had dangerous levels of house depressurization.

The research findings are being disseminated throughout the builder, code official, and research communities in order to solicit solutions. A Task Group has been started under National Research Council. The contractor will test potentially compliant systems in three houses in Manitoba this fall.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2062 0200001
STATUS : Ongoing Project

HVAC SYSTEMS OF MID AND HIGH-RISE RESIDENTIAL BUILDINGS

An evaluation of the mechanical systems of 25 mid and high-rise residential buildings has been performed in order to determine the changes in design and installation practices required by the 1995 National Building and Energy Codes. Additionally, the performance of the mechanical ventilation systems has been assessed in 10 buildings in terms of design criteria, design procedures, system strategies and installed performance levels. The research found that air tends to move through apartment buildings more by accident than design. This is due to a lack of information on the environmental conditions and building physical characteristics that govern natural and mechanical air flow. Consequently, it is difficult to ensure that there is adequate fresh air delivery to any point in a building, given conventional mechanical air system design. This information will be used to produce advisory documents showing how to meet codes and improve system performance. Final report is in production.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1424 0200001
STATUS : Ongoing Project

IDENTIFYING AND REMOVING POLLUTANTS FORM HEAT RECOVERY VENTILATORS

This study investigated the presence of allergens such as dust and molds in heat recovery ventilation systems and the duct work. It also looked at two different types of cleaning equipment and their ability to clean these pollutants from the rigid and flexible ductwork and heat recovery ventilator (HRV) cores in dedicated balanced supply and exhaust ventilation systems. Samples from the ductwork and cores of ten ventilation systems were tested for levels of dust and mold. The ductwork and cores were then cleaned using standard ductwork cleaning apparatus, then tested again to indicate the success of the cleaning process. All houses were tested for air and surface mold counts using an RCS air sampler and typical swab collection systems. Two of the ten houses were re-tested over a period of fifteen months. There were high mold counts on the surfaces of the supply air ducts. However, there was no correlation to house air mold counts, which were found to be inconclusive. It could not be determined whether airborne molds were considered a health risk in the houses as tested. It was also found that conventional equipment was not effective in cleaning the ductwork systems.

Prepared by Terry Watters, Sustainable Housing and Education Consultants Ltd. CMHC Project Officer: Don Fugler. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

LOW TEMPERATURE HYDRONIC HEATING SYSTEMS

The objective of this project is to investigate low temperature hydronic systems (LTHS) as an energy option and identify additional information and action needed to assess, document, and appropriately advance LTHS.

CMHC Project Officer : *Ken Ruest*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1570 0200001
STATUS : Ongoing Project

MONITORING A DUAL HEATING SYSTEM INSTALLATION

This research will monitor and assess the performance of a dual fuel heating system in an 89 suite apartment building. Originally, the building was heated with electric baseboards. The presence of natural gas fired boilers allowed the installation of hydronic radiant panels within apartments to shift the heating load from electricity to natural gas. Following the installation of the system, the energy consumption of the building was tracked for a one-year period. A report will be issued that describes the system and its potential to reduce energy costs.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1899 0200004
STATUS : Ongoing Project

PART-LOAD AND FROSTING CONTROL FOR ROTARY ENERGY WHEELS USED IN RESIDENTIAL BUILDINGS

The objective of this research is to determine the performance of rotary energy wheels, also called enthalpy wheels, for ventilation air exchange in residential buildings while subjected to a wide range of operating conditions.

CMHC Project Officer : *Duncan Hill*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2007 0200001
STATUS : Ongoing Project

RETROFITTING VENTILATION

This project is to examine how effectively ventilation can be retrofitted to existing houses, either as a standalone project or as part of a larger renovation. The research team will test the effectiveness of retrofitted ventilation systems in older homes and their effects on indoor air quality. It will also describe practical methods for installing ventilation equipment and ducting in older homes.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2063 0200001
STATUS : Ongoing Project

HEATING AND VENTILATION

REWRITING TEST STANDARD CAN/CGSB-149.10 - DETERMINATION OF THE AIRTIGHTNESS OF BUILDING ENVELOPES BY THE FAN DEPRESSURIZATION METHOD

The objective of this project is to re-write the airtightness test standard CAN/CGSB-149.10.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1971 0200002
STATUS : Ongoing Project

TO ASSESS THE PERFORMANCE OF THE LEBRETON FLATS DISTRICT HEATING SYSTEM

The Lebreton Flats district heating system, installed 20 years ago, is one of few examples of low temperature district heating systems in North America. The availability of fuel consumption and maintenance records for the system allows for an assessment of the performance of the system over the last 20 year period. It will also allow for a comparison of the district system with more conventional heating system options. Monitoring will be undertaken to assess the performance of the plant. Recommendations regarding system performance, potential upgrades and future operation, maintenance needs and other ownership/management arrangements will be made.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2134 0200001
STATUS : Ongoing Project

HIGH-RISE AND MULTIPLE UNIT CONSTRUCTION

ADVISORY DOCUMENT ON MECHANICAL AND ELECTRICAL SYSTEMS IN MULTI-UNIT RESIDENTIAL BUILDINGS

An advisory document on the design of energy conserving equipment and systems providing plumbing, heating, ventilation and air conditioning, lighting and power in multiple-unit buildings has been reviewed by practitioners. The system design and installation practices noted in the report are being modified to reflect their comments. An advisory document to recommend "good engineering practice" for designers, owners and consultants should be available in 1999.

CMHC Project Officer : *Duncan Hill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1774 0300004
STATUS : Ongoing Project

BC MOISTURE PROBLEMS - COMPUTER SIMULATIONS

This research will study, through the use of computer simulations using the WALLDRY computer program, the drying potential of various wall configurations and is intended to provide data to bolster recommendations to be incorporated in the "Best Practice Guide for the Coastal Area of British Columbia". The results of the work will also be used to guide in the development of the Envelope Drying Rate Analysis Project. As the cost of doing all the tests proposed is prohibitive, it was recommended that computer simulation WALLDRY be used to determine which walls might be more promising to test than others, potentially leading to a reduction in the cost of the test program.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 1816 0300004*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

BC MOISTURE PROBLEMS - ENVELOPE DRYING RATES EXPERIMENT

Findings from the 'Survey of Building Envelope Failures in the Coastal Climate of British Columbia' revealed that the construction of walls with face seal or concealed barrier systems does not promote rapid drying of wall assemblies once the moisture has saturated the moisture barrier and passed into the sheathing. The solution to promote drying of the wall assembly has been to introduce an air cavity behind the claddings. The objective of this project is to identify, through laboratory work, a range of cavity and vent configurations which will provide wall drying capability characteristics necessary to deal with the coastal British Columbia climate. In addition to the vents, the effect of insulation, vapour barrier, type of building paper and type of cladding will be investigated.

CMHC Project Officer : *Mark Salerno, Sylvio Plescia* — *CIDN : 1816 0300009*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

BC MOISTURE PROBLEMS - HYGROTHERMAL PERFORMANCE OF STUCCO

The project objectives are to develop fundamental and applied understanding of the hygrothermal performance of stucco based wall systems for Vancouver, B.C. weather conditions. The properties will be investigated through laboratory evaluation. The long term hygrothermal behaviour of the building envelope components will be simulated using the LATENITE computer program. The result of the work will guide the "Envelope Drying Rate Analysis" study. The work is being collaboratively funded with the NRC/Institute for Research in Construction and is part of the recently launched Consortium on Moisture Control Strategies of Wall Systems.

CMHC Project Officer : *Jacques Rousseau, Mark Salerno*

CIDN : 1816 0300007

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

BC MOISTURE PROBLEMS - QUALITY ASSURANCE PROTOCOL

The objective of this study was to produce a protocol which will form the baseline quality management system for the exterior envelope of 3 and 4 storey wood frame construction in British Columbia. The protocol deals with the conclusion and recommendations identified in the "Survey of Building Envelope Failure in the Coastal Climate of British Columbia". The protocol will also tie into the "Best Practice Guide for Wood Frame Construction in the Coastal Climate of British Columbia". The draft protocol has been reviewed and is being tested in a real project in order to refine it.

CMHC Project Officer : *Jacques Rousseau, Mark Salerno* *CIDN : 1816 0300006*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

BC MOISTURE PROBLEMS - SMALL SCALE TESTING AND DEVELOPMENT PROTOCOL

This work results from the conclusions and recommendations of the "Survey of Building Failures in the Coastal Climate of British Columbia". The intent of this initial testing project was to give the industry some sense of what will or will not work and examine the sensitivity of the various systems to specific variables. The testing provided a relative comparison under a specific set of environmental conditions. Although the work did not provide a definitive solution, it did demonstrate that the drying potential due to diffusion in the coastal climatic environment was very small. The work has been used to develop the protocol for the "Envelope Drying Rate Analysis" which is currently underway to investigate other drying mechanisms. This project was funded in collaboration with the NRC/Institute for Research in Construction, the City of Vancouver, Van Maren Limited, Centreville Limited and Aquastap Limited.

CMHC Project Officer : *Jacques Rousseau, Mark Salerno* *CIDN : 1816 0300005*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

BEST PRACTICE GUIDE - FIRE AND SOUND ASSEMBLIES FOR MULTI-FAMILY BUILDINGS

This document, targeted at designers of multi-family buildings, will provide the latest information on CMHC research into fire and sound partitions, floors, flanking, plumbing noise, etc. The document is being produced in collaboration with the NRC/IRC.

CMHC Project Officer : *Ken Ruest* *CIDN : 1804 0300003*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

BEST PRACTICE GUIDE FOR EXTERIOR INSULATED FINISHED SYSTEMS (EIFS)

The purpose of this project is to undertake and complete the Best Practice Guide. The guide is intended for designers and will provide solutions to commonly found details in the building envelope design process, as it relates to EIFS.

CMHC Project Officer : *Luis de Miguel* — *CIDN : 2047 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CASE STUDIES FOR INNOVATIVE TECHNOLOGY AND SOLUTIONS IN SUCCESSFUL MULTI-FAMILY HOUSING

Successful innovative Canadian multi-family residential buildings are being identified and documented for future monitoring. Areas such as durable building envelope, energy savings, life-cycle costs and environmentally responsive solutions will be evaluated. One multi-family residential building, the Conservation Co-operative, was selected for evaluation and was presented at the Green Building Challenge in Vancouver in the Fall of 1998. Posters of several Canadian residential projects were prepared for the October GBC conference. The selected systems are the subject of illustrated case stories which also are available on the Research website www.cmhc-schl.gc.ca/research/highrise.

CMHC Project Officer : *Sandra Marshall* — *CIDN : 1817 0300001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CASE STUDY OF THE RENOVATION OF AN APARTMENT BUILDING WITH SOLID MASONRY WALLS

A 90 year old commercial building with solid masonry walls has been gutted and renovated into a residential building for low income single persons. The renovation involved the addition of thermal insulation to the building envelope, the application of stucco to the exterior of three of the four sides of the building, restoration to the front masonry facade, installation of a balanced mechanical ventilation system and a combination hydronic baseboard/radiant floor heating system. The building envelope is being monitored to provide an indication of its potential long-term performance. Energy use and indoor air quality will also be monitored in the renovated building to assess the strengths and weaknesses of the renovation strategy. A case study will be produced to document the work undertaken and the results of the performance monitoring.

CMHC Project Officer : *Duncan Hill* — *CIDN : 1730 0300002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

COMPARATIVE ANALYSIS OF RESIDENTIAL CONSTRUCTION IN SEATTLE, WA AND VANCOUVER, B.C.

This project has compared the differences in construction to determine if a similar cause of building envelope failure is occurring in the typical low rise multi-unit (3 to 4 storey) wood framed residential development built in the Seattle area. The study has demonstrated that similar problems are occurring in Seattle.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 1569 0300003*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CONTRIBUTION TO THE PREPARATION OF AN ANALYSIS OF OPERATING AND MAINTENANCE COSTS STUDY

The objective of this project is to obtain up-to-date and regional financial information on operating and maintenance costs for approximately 100 multiple housing projects, using year end financial statements.

CMHC Project Officer : *Sandra Marshall* — *CIDN : 1561 0300003*

Division : *Research Division* — *STATUS : Completed*

AVAILABILITY : *Publication is not available*

ENVIRONMENTAL IMPACT ASSESSMENT TOOLS FOR MULTI-UNIT HOUSING

This project will assess 6 different environmental assessment tools to determine their applicability to multi unit residential buildings. The best features and limitations of each tool will be identified and transmitted to the authors of each tool. Four innovative buildings will then be assessed by one of the tools. This work was presented to the Green Building Challenge '98 (GBC) Committee as part of CMHC's contribution to the development of the residential component of the Green Building Challenge overall evaluation criteria for buildings of all types. The GBC is an international conference on the performance assessment of buildings held in Vancouver October 1998. Further work will be done in 1999 to develop a comprehensive environmental impact assessment tool for highrise buildings, including the identification of related benchmarks, and the associated costs and savings from reducing environmental damage.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 1872 0200*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

EXPORTING CMHC'S TECHNICAL SEMINAR SERIES

Over the past fifteen years, CMHC has undertaken research work into the development of technologies for highrise buildings. The work could be marketable in the US and other countries where they are being faced with similar concerns regarding energy efficiency, airtightness, noise control and rain penetration control of the building envelope. CMHC's research activities into the building sciences were undertaken by Canadian consulting firms who have gained considerable knowledge that could also be marketed in other countries. A pilot series of seminars is being developed to be conducted in the USA in partnership with the Building Environmental Thermal Envelope Council with funding from the Dept. of Energy.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 1928 0200*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

GOVERNOR'S ROAD AND SPENCER CREEK VILLAGE PROJECT, DUNDAS, ONTARIO

The purpose of this project was to carry out the CMHC Healthy Housing and IDEAS Challenge objectives on the Governor's Road and Spencer Creek Village project in Dundas, Ontario.

CMHC Project Officer : *Sandra Marshall* — *CIDN : 0840 0309007*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

GUIDELINES FOR THE RETROFIT OF UNINSULATED MASONRY WALLS

In cooperation with NRC's Institute for Research in Construction, a project has been initiated to assess common forms of solid masonry walls in commercial and residential buildings and current energy retrofit strategies. Investigations of previously retrofitted walls are being performed to determine the impact on the durability of the building envelope.

CMHC Project Officer : *Duncan Hill* — *CIDN : 1730 0300003*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication will not be published*

HIGH-RISE APARTMENT REPAIR NEEDS ASSESSMENT IN THE FORMER CITIES OF TORONTO AND YORK

A representative sample of 63 multifamily rental buildings in Toronto have been audited in order to determine their condition. The buildings were examined to determine their durability, in areas such as health and fire safety, mechanical systems and the related repair costs. The project is a joint initiative with the City of Toronto. Preliminary results show the average repair costs to be $7, 474 over ten years, not including regular maintenance or interior finishes. For building envelope systems, complaints due to leaks rise from 12% in pre-60s construction to 45% in post-70s buildings.

CMHC Project Officer : *Sandra Marshall*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1537 0300001
STATUS : Ongoing Project

IDEAS HIGH-RISE CHALLENGE

The IDEAS Challenge is intended to demonstrate the benefits of innovative design and technology in the operation of high-rise residential buildings. The Challenge focuses on five aspects of building design: envelope durability, energy efficiency, indoor air quality, environmental conservation and accessibility. One project in Montreal is built and monitoring is being carried out. Acoustic details have been tested. Two booklets are available, one that describes the IDEAS Challenge and the features of the five finalist projects and another which is a "Better Building" guide to innovation in the design and construction of high-rise residential buildings. The design process of a building in Dundas, Ontario which is exploring the adaptation of the IDEAS Challenge goals and details of CMHC's Best Practice Guide, is being documented. Projects in Vancouver and Edmonton are also ongoing.

CMHC Project Officer : *Sandra Marshall*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 0840 0300
STATUS : Ongoing Project

MODELLING OF AIR/MOISTURE MOVEMENT AND DURABILITY PERFORMANCE OF RESIDENTIAL AND COMMERCIAL BUILDINGS

The purpose of this project is to develop knowledge to assess the impact of various wall designs, ventilation and indoor environment conditions on the durability and energy efficiency of new and retrofitted high-rise residential and commercial building systems.

CMHC Project Officer : *Duncan Hill* — *CIDN : 1934 0200003*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

MONITORING INNOVATIVE MECHANICAL AND ELECTRICAL SYSTEMS

The innovative mechanical and electrical energy consuming and producing systems in high-rise housing at a recently completed housing project in Toronto, are being monitored. A gas-fired cogeneration system was installed that provides electricity and thermal heat to the building. The building's owners are concerned that the system is not performing in an economically viable manner. An extensive monitoring and performance assessment is underway to evaluate system performance. The cost of energy provided to the building by the cogeneration system in terms of fuel consumption, maintenance expenditures, avoided utility invoicing and other considerations will be assessed. The performance and cost of the cogeneration system will be compared to other alternative but more conventional options.

CMHC Project Officer : *Duncan Hill* — *CIDN : 1260 0800001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

MONITORING THE RETROFIT OF A RESIDENTIAL HIGH-RISE BUILDING ENVELOPE

A case study of a 20 year old high-rise building in Toronto has been undertaken to document and monitor the performance of the retrofitted walls. In November 1997, an Exterior Insulating Finish System (EIFS) was installed over the precast block walls as part of an overall building renewal project. Instrumentation to monitor heat, air and moisture regimes within the wall sections was installed which is currently being monitored for one year to assess the performance of the retrofit strategy. Preliminary results indicate that the walls are performing in a satisfactory manner but an assessment of the full year's monitoring will be necessary to draw conclusions concerning the retrofit measure.

CMHC Project Officer : *Duncan Hill* — *CIDN : 1602 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

OPERATING AND MAINTENANCE BOOKS FOR MECHANICAL AND ELECTRICAL SYSTEMS IN MULTI-UNIT BUILDINGS

Two publications, currently in 'draft' stage, on improving the operating performance of modern residential building systems have been developed. The first document, for owners and managers, links good operating practices with desirable investment strategies. The second, for building operating and maintenance staff, updates information on mechanical and electrical systems and incorporates preventative maintenance checklists for multi-unit residential buildings.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 1774 0300004*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

PERFORMANCE MONITORING: BRICK VENEER/STEEL STUD (BV/SS) WALL SYSTEM: PHASE 4

Phase 4 of this study involves a fourth year (1997/98) of in-situ performance monitoring of a BV/SS wall system, with respect to air and moisture movements after the top vents in the brick veneer wall have been opened. The performance of a wall is being monitored using temperature, moisture and air pressure sensors connected to an automatic data logging system. Preliminary results indicate that the vent holes did not contribute to drying the wall but increased the moisture loading of the brick veneer. Even though the BV/SS wall system is typical of current practices and workmanship was satisfactory, the results of the study demonstrate that performance problems exist that may lead to significant distress over the long term. The more serious performance problems identified in this study are due to design weakness demonstrating the need to improve design and construction standards. Phase 1 & 2 reports are available from CMHC. The results of the Phase 3 research demonstrated no significant difference from Phase 1 and 2 and the Phase 4 draft report has been received.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 0787 0300001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RAIN PENETRATION CONTROL

This document, currently in the 'draft' stage, provides the latest information on controlling the penetration of rain into walls. It is based on CMHC's research and other information regarding rain penetration control. The work is being funded in collaboration with the American Architectural Manufacturers Association. A copy of the draft can be obtained from Jacques Rousseau.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 1258 0300004*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RAINSCREEN 2.1 COMPUTER PROGRAM

The RAINSCREEN program has been developed to assist in the design of rainscreen pressure equalized wall assemblies. A new version of the RAINSCREEN computer program, including a tutorial program and a manual that will be much more user-friendly has been produced and is available on the web at the following address:http://www.cmhc-schl.gc.ca/Research/HighRise/files/rainscreen.html

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 1258 0300005*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

REMEDIATION OF MOISTURE TROUBLED WOOD FRAMED BUILDINGS IN THE COASTAL CLIMATE OF B.C.

This project will research and prepare diagnostics and recommended procedures for the cost effective remediation of leaking condominiums in the lower mainland of B.C. The project will develop a standard method of damage assessment, to develop a solutions tool which considers technical, code compliance, financial implications and practicality of repair. A document will also be prepared for property managers and for strata councils - on maintenance and repair issues. The project duration is expected to be one year.

CMHC Project Officer : *Ken Ruest, Mark Salerno* — *CIDN : 2061 0200*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

REPAIR AND RETROFIT CASE STUDIES FOR MULTI-UNIT RESIDENTIAL BUILDINGS

CMHC is documenting repair and retrofit activities in multi-unit residential buildings. The first 30 case studies will document building characteristics, the type of problems that prompted the repairs and retrofits, costs, benefits, etc. A wide range of case studies will be included to reflect regional repair and retrofit priorities. The studies will be useful for other members of the multi-unit residential building industry to refer to when considering similar projects. An information template that can be used as a guideline for the type of information that should be extracted from a repair or retrofit project in a multi-unit residential building has been developed. CMHC is currently soliciting the building industry for case studies and will retain consultants to provide the necessary documentation. A compendium of case studies will be assembled and made available.

CMHC Project Officer : *Luis de Miguel* — *CIDN : 1782 0300001-7*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

RESEARCHING THE ROLE THAT ISO 14001 (ENVIRONMENTAL MANAGEMENT SYSTEMS) CAN PLAY IN MULTI-UNIT RESIDENTIAL HOUSING MANAGEMENT

The purpose of this project is to identify whether or not the International Standard ISO 14001, "Environmental Management Systems - Specification with Guidance for Use" has a role to play in residential building management. If this research determines that ISO 14001 does have a role to play, the research will strive to identify the exact nature of that role.

CMHC Project Officer : *Silvio Plescia*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200007
STATUS : Ongoing Project

REVISION TO MONITORING PROTOCOL

The purpose of this project is to rewrite the protocol in a more modular fashion; expand the monitoring protocol to include monitoring, interpretation of data; remove the original reference to the IDEAS Challenge Project; and revise graph data presentation.

CMHC Project Officer : *Jacques Rousseau*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 0840 0306012
STATUS : Ongoing Project

STUDY TO EVALUATE CAUSES OF MOISTURE PROBLEMS IN ALBERTA HOUSING

In partnership with the Alberta Housing Industry Technical Committee, this project is to investigate the alleged problem of moisture ingress into low-rise wood frame housing in Alberta. At the present time, industry opinion is divided on the source of moisture critical to the cause of reported water leakage incidents and this study will provide some clarity to the issue.

CMHC Project Officer : *Ken Ruest, Halayna Tataryn*
Division : *Research Division*
Prairie Region Business Centre
AVAILABILITY : *Publication is not available*

CIDN : 2066 0200001
STATUS : Ongoing Project

TESTING OF DYNAMIC BUFFER ZONE (DBF) METHOD ON 312 CUMBERLAND STREET, OTTAWA

The purpose of this project is to test a Dynamic Buffer Zone (DBF) method in the air space behind the brick cladding on a building.

CMHC Project Officer : *Luis de Miguel*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 0411 0305002
STATUS : Ongoing Project

WIND-DRIVEN RAIN FOR THE GOVERNOR'S ROAD PROJECT

Continuing previous research, this project explores the impact of roof cornice design in providing protection from wind-driven rain at the top of a multi-family building in Dundas, Ontario in order to better optimize the roof design.

CMHC Project Officer : *Sandra Marshall*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : *1123 0300013*
STATUS : *Ongoing Project*

WOOD-FRAME ENVELOPES IN THE COASTAL CLIMATE OF BRITISH COLUMBIA. BEST PRACTICE GUIDE, BUILDING TECHNOLOGY

Building in BC's coastal climate has special challenges -- and this 256 page guide is the most up-to-date, authoritative information available to help meet those challenges. This guide provides the most comprehensive technical information on how to build to withstand the conditions of BC's coastal climate.

The guide is intended to provide guidance, primarily to designers, for the design of the building envelopes of multi-unit wood-frame buildings in the coastal climate zone of British Columbia. The guide should also be useful to the construction industry in general, encouraging an understanding of the behaviour and performance of building envelope assemblies. Much of the material in the guide may also be applicable to other climate zones and building types.

Although the guide is intended to reflect good practice in general, its primary focus is on the management of moisture, since moisture-related performance problems prompted this initiative. The guide therefore does not deal specifically with structural, acoustic or fire and safety issues that may also have an impact on the design of the building envelope.

The information in the guide includes behaviour of wood in construction, moisture source control strategies, heat flow mechanisms, typical envelope assembly characteristics, and materials for inclusion in specifications, quality assurance strategies, maintenance and renewal strategies and more than fifty-three state-of-the-art CAD details showing several air barrier strategies, all included on the companion CD-ROM.

Endorsed by the Canadian Wood Council (CWC) and the Building Envelope Research Consortium (BERC).

Prepared by RDH Building Engineering Limited in joint venture with Morrison Hershfield Limited. The two dimensional drawings were prepared by Hewitt Tan Kwasnicky Architects Inc. and the chapter on Behaviour of Wood was prepared by Don Onysko. Ottawa: Canada Mortgage and Housing Corporation, 1999.

Order number: NE2178 **Price: $89.00 + GST and handling charges.

STATUS : Completed Report

AVAILABILITY : *CMHC Information Products*
P.O. Box 35005
Stn BRM B
Toronto, Ontario M7Y 6E5
1-800-668-2642
Fax orders from Canada: 1-800-245-9274
International clients see page 9 for order instructions.

HIGH-RISE AND MULTIPLE UNIT CONSTRUCTION

WOOD FRAME ENVELOPES. BEST PRACTICE GUIDE, BUILDING TECHNOLOGY

Designer, builders, building owners and managers who consult this guide should gain a general understanding of the principles and practical considerations of designing and constructing wood frame envelopes. The Guide emphasizes the best residential construction practice details and specifications used in design offices and on construction sites across Canada.

The information includes the behaviour of wood in construction, moisture control strategies, heat flow mechanisms, typical envelope assembly characteristics, components and materials for inclusion in specifications, quality assurance, maintenance and renewal strategies. More than 30 clearly drawn construction details on CD-ROM are easy to download into a CAD program. Metric and imperial measures, French and English in different layers.

Prepared for Canada Mortgage and Housing Corporation by Otto Bryden Erskine Martel Architects Inc., and subsequently by Otto and Erskine Architects Inc., in joint venture with Halsall Associates. The National Research Council of Canada, the Canadian Home Builders' Association, the Canadian Wood Council and the New Brunswick Home Builders' Association assisted in development of this book. Ottawa: Canada Mortgage and Housing Corporation, 1999.

Order number: NE6921 **Price: $89.00 + GST and handling charges.

STATUS : Completed Report

AVAILABILITY : *CMHC Information Products*
P.O. Box 35005
Stn BRM B
Toronto, Ontario M7Y 6E5
1-800-668-2642
Fax orders from Canada: 1-800-245-9274
International clients see page 9 for order instructions.

HOUSE CONSTRUCTION

ABOUT YOUR HOUSE 'LOG HOMES'

The object of this project is to draft an 'About Your House' document on Log Homes. The document will describe logistics, benefits, and new technologies in log home construction.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1584 0300006
STATUS : Ongoing Project

APPLICATION OF STRUCTURAL STEEL TO SINGLE-FAMILY RESIDENTIAL CONSTRUCTION

This study is an investigation of the use of structural steel in single-family residential construction, and an analysis of its applicability to Canada, taking into account technical requirements, cost-effectiveness, and sustainability.

With the rise of housing costs, global competition, and increasing environmental concerns, new systems and innovative uses of material are required to supplement the existing construction methods. Numerous studies have demonstrated the potential of steel for building and its advantage in terms of price, performance, and physical properties. Residential projects in steel are usually built with lightweight metal framing systems. Structural steel is seldom used, although it offers additional advantages in terms of performance, economy, flexibility, and speed of construction, as well as a wide availability of skills, trades, and experience from the commercial and industrial building sector.

The purpose of the study is to provide to decision-makers in the building industry a clear view of the possibilities offered by the application of structural steel to housing.

The 200-page report addresses the following topics:

- *steel and metal building systems in the context of housing;*
- *existing steel houses worldwide and in Canada;*
- *source of information for steel technology;*
- *compliance with building codes;*
- *Canadian steel suppliers and trades;*
- *prototype design of a steel house;*
- *steel house and sustainability.*

Prepared by Michel de Spot, Node Engineering Corp. CMHC Project Officer: Rob Duncan. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

BUILDER'S WORKSHOP SERIES TRAINER'S MANUAL

The objective of this project was to revise and update the three remaining modules for inclusion in the Builder's Workshop Series Trainer's Manual, (i.e. Indoor Air Quality, Ventilation and Noise Control). The first four modules: Foundations, Wall Assemblies, Floor Assemblies, and Roof and Ceiling Assemblies have already been updated and are now in publishing phase. The IAQ, Ventilation and Noise Control training modules will be updated to coincide with the applicable information in "Building Solutions: A Problem Solving Guide for Builders and Renovators" and with current building codes and practices. These modules will be developed for presentation as two to three hour workshops, suitable for delivery at builder forums.

CMHC Project Officer : *Darrel Smith*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2130 0200001
STATUS : Ongoing Project

CD-ROM VERSION OF THE CANADIAN WOOD-FRAME HOUSE CONSTRUCTION

The purpose of this project is to design and develop an internet based CD-ROM version of CMHC's "Canadian Wood-Frame House Construction" publication complete with a number of multimedia enhancements. It will also include the "Glossary of Housing Terms" with links from "CanadianWood-FrameHouse Construction", to serve as an illustrated glossary. It is anticipated to be available by mid 2000.

CMHC Project Officer : *Darrel Smith*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2123 0200001
STATUS : Ongoing Project

COMPARATIVE STUDY OF ALTERNATIVE FRAMING AND BUILDING SYSTEMS FOR LOW-RISE HOUSING

The purpose of this project is to conduct a comparative study of the various alternative framing and building systems for low-rise housing in use today. These may include but not be limited to insulating concrete forms, straw bale, structural insulated panels, stack wall log and steel. The results of this study will be beneficial to those in the industry to help them make better informed decisions on choice of framing and building systems.

This study will take an inventory of and investigate the differences, benefits and limitations of the common and innovative building systems which are currently in use as compared to the typical wood-frame, stick-built construction of low-rise housing. It will consider the advantages and/or disadvantages of the various systems for use in remote areas as well as the potential for exporting to other countries. The study will examine all of the factors to be considered by a builder or homeowner to help them understand the differences between the available system choices so they may evaluate and select systems appropriate to their clients, house designs, trade practices and skills, and regions.

CMHC Project Officer : *Darrel Smith* — *CIDN : 2119 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CSA Z-824 STANDARD

The objective of this project is to take the existing draft of the CSA Z-824 Log Standard, rationalize the organization of the standard contents, and produce a draft for comment.

CMHC Project Officer : *Rob Duncan* — *CIDN : 1811 0300001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

DEVELOPMENT OF COMMERCIALLY VIABLE CONCEPTS AND A DESIGN FOR A RESIDENTIAL FRAMING SYSTEM FOR A MONOCOQUE HOUSE

The purpose of this project is to undertake the development of commercially viable concepts and a design for a residential framing system for a monocoque house, to provide on-site guidance during the construction of prototypes of the design and to undertake post construction performance monitoring of the structures.

CMHC Project Officer : *Rob Duncan* — *CIDN : 0657 0300001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

DEVELOPMENT OF GENERIC ENGINEERED DETAILS FOR THE CONSTRUCTION OF RESIDENTIAL TALL WALLS

Part 9 of the Alberta Building Code (1997) defines maximum allowable heights for exterior loadbearing walls based on their physical characteristics and the loads they support. The code, however, only specifies requirements for walls up to approximately 12 feet in height. Walls exceeding that height must be individually engineered. Significant time and expense could be saved through the availability of generic, engineered data which would allow builders in Alberta to select appropriate material and installation configurations for the tall wall requirements incorporated in their various projects. The purpose of this project was to develop such data.

Several general configurations were identified for analysis. These configurations included both solid walls and walls with varying window layouts. The range of wall dimensions was 7 to 16 feet in width by 10 to 20 feet in height. Some appurtenant components generally thought to provide additional support for tall walls were also included in the analysis. These included horizontal feature shelves, fireplaces located in corners and intra-span, interior partitions, and hip roofs.

Developmental work followed generally accepted principles of limit states design. Load carrying capacity and lateral deflection were defined as the governing limit states. The general design philosophy encompassed examination and classification of live loads throughout the province, and development of tables that link the load classification at a particular location to allowable tall wall characteristics for that location.

Two types of tall walls were developed. The first case - tables which identify the maximum widths of loadbearing walls of given height - was chosen as a means of addressing the option to construct tall walls in two vertical lifts. The second case - tables that identify the maximum height to which a loadbearing wall may be built - addresses the option of building tall walls with full height stud members. In the first case, stress and deflection due to wind loads constituted the governing conditions. Allowable deflection was set at 1/180 of the width of the wall. In the second case, the combination of axial loading and bending moments caused by wind loading was considered, and either stresses or deflections governed the allowable height of the wall, depending on load combination.

The structural contributions of the appurtenant components studied were found to be minimal. From the generic perspective, whatever contributions could be afforded by these items would be lost to design allowances that would have to be made to compensate for the large number of variables associated with their installation. These variables include vertical and horizontal positions on the wall, materials used, and fastening methods used. Details describing these items would have to be intricate and the potential for another field variable - misapplication of intended specifications - would likely be introduced.

The tables developed within the scope of this project allow extension of the existing limits of the Alberta Building Code, 1997 edition. Table 9.23.10.1 of the code allows walls up to approximately 12 feet in height to be built without professional design input. Properly utilized, these tables allow the construction of walls up to approximately 25 feet in height (dependent upon load conditions) to be built in Alberta without professional design input. Some situations will exist where the tables do not address the requirements of a particular project or a particular project cannot comply with the conditions accompanying the use of the tables, and in these circumstances, individual professional design will remain a requirement.

Prepared by Campbell Woodall & Associates Consulting Engineers Ltd. CMHC Project Manager: Darrel R. Smith. Prepared for Research Division, Canada Mortgage and Housing Corporation. Ottawa: CMHC, 1999.

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

EASY-ACCESS THRESHOLDS TO BALCONIES: PROBLEMS AND POSSIBLE SOLUTIONS

The objective of this project is to demonstrate to architects, builders, developers and regulatory agencies the possibilities of producing easy-access thresholds to balconies in new or renovated residential buildings.

CMHC Project Officer : *Sandra Marshall*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1995 0200001
STATUS : Ongoing Project

RESIDENTIAL DECONSTRUCTION MANUAL

The intent of this manual is to provide project managers (architects, engineers, interior designers, associated technicians and technologists, contract administrators, contractors, and site supervisors) involved in residential (single family and multi-unit) demolition with a reference tool to assist them in the economic feasibility assessment, planning and supervision of deconstruction.

Prepared by Derek Badger. CMHC Project Manager: Darrel R. Smith. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

TRANSLATION OF CANADIAN WOOD FRAME HOUSE CONSTRUCTION HANDBOOK 1998 AND THE GLOSSARY OF HOUSING TERMS 1997 REVISED EDITION INTO GERMAN

The purpose of this project is to translate the Canadian Wood Frame House Construction Handbook 1998 and the Glossary of Housing Terms 1997 revised edition into German.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1973 0900001
STATUS : Ongoing Project

TRANSLATION OF CANADIAN WOOD FRAME HOUSE CONSTRUCTION HANDBOOK 1998 AND THE GLOSSARY OF HOUSING TERMS 1997 REVISED EDITION INTO RUSSIAN

The purpose of this project is to translate the Canadian Wood Frame House Construction Handbook 1998 and the Glossary of Housing Terms 1997 revised edition into Russian.

CMHC Project Officer : *Louis Musto* — *CIDN : 1973 0900003*

Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

TRANSLATION OF CANADIAN WOOD FRAME HOUSE CONSTRUCTION HANDBOOK 1998 AND THE GLOSSARY OF HOUSING TERMS 1997 REVISED EDITION INTO SPANISH

The purpose of this project is to translate the Canadian Wood Frame House Construction Handbook 1998 and the Glossary of Housing Terms 1997 revised edition into Spanish.

CMHC Project Officer : *Louis Musto* — *CIDN : 1973 0900002*

Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

USE OF CONVENTIONAL CROSS BRIDGING IN WOOD-I-JOIST FLOORS

The purpose of this project is to test the performance of wood-I joist floor systems with conventional and improved bridging under static and dynamic loads, to evaluate the effectiveness of conventional bridging in wood-I joist floor systems under static concentrated and dynamic load conditions and to evaluate the effect of the location of the bridging. The research will also investigate an improved method of attaching bridging to wood-I joists. The final report should be available late in 1999.

CMHC Project Officer : *Darrel Smith* — *CIDN : 2144 0200002*

Division : *External Research Program, Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

HOUSE CONSTRUCTION INDUSTRY

TECHNOLOGY DISSEMINATION - A NEW APPROACH

Despite significant national efforts, the Canadian residential construction industry is often resistant to the introduction of cost saving technologies, due in part to most contractors having limited abilities to research, evaluate and introduce such advances. The goal of this External Research Program work is to devise an information dissemination technique which focuses on the process of innovation introduction rather than the innovations themselves. It is felt that by "reasonably demonstrating" the value of various innovations to subcontractors, there will subsequently be a "natural" spread to other projects as the subcontractors utilize their newly acquired cost-effective techniques to gain a competitive advantage.

CMHC Project Officer : *Thomas Green*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200016
STATUS : Ongoing Project

HOUSING DESIGN

FLEXHOUSING DESIGN DEMONSTRATION

CMHC's FlexHousing is a new and innovative approach to home design, renovation and construction, able to adapt and convert affordably as people's lifestyles change. This exciting and practical approach to designing and building housing of all kinds - from single family, duplexes, multi-unit and even apartments allows residents to convert space to meet their changing needs. A 1996 CMHC design competition has spawned open houses of the winning designs and publications.

The Canadian Centre for Housing Technology at the National Research Council will feature the winning FlexHouse Design in its Information Centre, opening in October 1999. More information is available on the CMHC Home page or the new publication "FlexHousing - Homes That Adapt to Life's Changes.

CMHC Project Officer : *Tom Parker*
Division : *Research Division*

CIDN : 1389 0300
STATUS : Ongoing Project

FLEXHOUSING INFORMATION FOR THE CANADIAN HOME BUILDING INDUSTRY

To develop information materials and activities to encourage understanding and uptake of FlexHousing principles by the homebuilding industry. A "Professionals' Guide to FlexHousing" will be produced in fall 1999. A professionals' seminar will be developed to complement this information. FlexHousing displays at home shows will be undertaken, as well as work with selected municipalities on model bylaws to facilitate FlexHousing adoption.

CMHC Project Officer : *Tom Parker*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200011
STATUS : Ongoing Project

LE PLEX RENOUVELÉ

This research report focuses on the Plex as an affordable and sustainable housing form. It traces its evolution and documents several historical types of it. The report appraises the Plex's advantages and proposes several design alternatives that would adapt it to the needs of contemporary households. The adapted Plex emerges as a flexible and economic form of housing most suitable for meeting the need for affordable housing. It is also an ideal form for infill and for more compact new neighbourhoods.

CMHC Project Officer : *Fanis Grammenos*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2096 0200001
STATUS : Ongoing Project

MONTRÉAL: A GREAT TRADITION OF MEDIUM-DENSITY HOUSING

This project aims to highlight the adaptation processes of housing and building types throughout the various phases of the evolution of "plex" formulas (duplex, triplex, fourplex, fiveplex ...) in Montreal over four construction cycles betwwn 1866 and 1935.

CMHC Project Officer : *Mark Holzman*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1455 0200001
STATUS : Ongoing Project

HOUSING DESIGN

PASSIVE SOLAR HOUSE DESIGN PILOT WORKSHOP

In partnership with the Solar Energy Society of Canada (SESCI), and with support from NRCan, this project will assist SESCI to develop and present a pilot workshop on passive solar house design in 2000. The content of the workshop will be based primarily on the CMHC TAP the SUN publication. The pilot workshop will provide experience and feedback for the possible future development of a series of passive solar design workshops for presentation across Canada.

CMHC Project Officer : *Thomas Green* — *CIDN : 2200 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SINGLES HOUSING DESIGN STUDY AND DESIGN CHARETTE

A precedent study to review and evaluate existing singles housing design projects in Canada and the United States, and to identify the legislative barriers to developing new singles/SRO housing in Toronto. A design charette to generate detailed unit and building designs.

CMHC Project Officer : *Anna Lenk* — *CIDN : 2183 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

INDOOR ENVIRONMENT

DEVELOPMENT OF MATERIAL EMISSION TEST STANDARDS

Improved test standards for emissions from caulks and sealants and urethane foam are currently being developed. These standards, currently in draft, are now being considered within the American Society for Testing and Materials (ASTM) process. NRC/IRC has developed a draft emission test standard for VOCs from pressed wood products. Revisions are being made to these draft standards in response to an ASTM committee ballot and will be resubmitted again this year, using new CMHC support funding, as requested by the Task Force on Material Emissions. It is anticipated that the ballot will be passed for inclusion of these standards into the ASTM process.

CMHC Project Officer : *Virginia Salares* — *CIDN : 1244 0201003*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

FIELD VALIDATION OF AN IAQ MODEL FOR PREDICTING THE IMPACT OF MATERIAL EMISSIONS ON THE INDOOR AIR QUALITY OF A NEWLY CONSTRUCTED HOUSE

The objective of this project is to contribute to the field validation of an IAQ Model for predicting the impact of material emissions on the indoor air quality of a newly constructed house.

CMHC Project Officer : *Virginia Salares* — *CIDN : 2110 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

GUIDE TO MECHANICAL EQUIPMENT FOR CLEAN INDOOR ENVIRONMENTS

Complementing the "Building Materials for the Environmentally Hypersensitive", this publication deals with heating, ventilating, air and water purification equipment for housing requiring special attention to air quality. The document is a reference guide for selecting new mechanical equipment for new construction or retrofits. The document includes discussions of the applicability of the equipment to environmentally hypersensitive individuals. The guide will be available in winter 2000.

CMHC Project Officer : *Virginia Salares* — *CIDN : 1031 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

INDOOR AIR POLLUTION FROM ATTACHED GARAGES

CMHC is contributing to a Health Canada/Environment Canada project investigating the infiltration of garage-based pollutants into houses. Twenty-five Ottawa houses have been tested to determine the leakage area between the house and the attached garage. Pressure differentials were recorded and pressure testing was repeated during the winter months. The current work includes modeling of the IAQ implications and monitoring of pollutant entry when the garage is occupied by a "calibrated" car. So far, modeling has not been very successful. Further field testing took place in the winter of 1998/99. Health Canada will be publishing the project reports.

CMHC Project Officer : *Don Fugler* — *CIDN : 1910 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

INDOOR AIR QUALITY TRAINING PROGRAM

A program to train residential indoor air quality problem investigators has been developed. The program consists of a three-day course, followed by a field training phase. Candidates for the program should have some expertise in building science and mechanical systems. A one-day seminar, the "Let's Clear the Air" seminar, is a prerequisite to the three-day course. Those who participated in the courses delivered in 1998/1999 have either completed or are completing their field training. A number of courses are planned for the next twelve months.

CMHC Project Officer : *Virginia Salares* — *CIDN : 1623 0300017*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

PRINCE EDWARD ISLAND BIRTH COHORT STUDY OF MOLD IN HOMES

This joint study between CMHC, Carleton University, Health Canada and others will ultimately look at several hundred homes in Prince Edward Island to determine the biological exposure, house performance parameters and energy use characteristics of a statistically-representative set of houses occupied by newborn babies. Part of the study will follow the health of these babies to determine the degree to which damp and moldy houses result in increased infant health problems. The second year of the study has been completed. Indications are of a high incidence of health problems and high levels of moisture and mold in the houses. Data is being analysed.

CMHC Project Officer : *Ken Ruest* — *CIDN : 1618 0300001-2*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

STUDY OF HOUSE RETURN AIR SYSTEMS USING FLOOR JOIST SPACES

Research was conducted on air in houses that is distributed through the ducting system consisting of supply ducts and a return air plenum. Floor joist spaces are being used as return plenums in new construction and this study characterizes the indoor air in a number of houses with return air plenums made of all metal, combinations of metal, solid wood, plywood or oriented strand board. A Research Highlight sheet is being prepared.

CMHC Project Officer : *Virginia Salares* — *CIDN : 1704 0300001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

STUDY ON THE EFFECT OF CONTROLLING THE HOME ENVIRONMENT ON ASTHMA

Six houses having one or more individuals suffering from asthma and in which the occupant's symptoms are linked to the house were inspected following the CMHC Residential IAQ Investigation Protocol. All houses were found to be severely moldy. The houses were subjected to tests for various indoor air parameters - CO2, VOC's, dust mite allergens and molds. Mold tests confirmed the inspection findings. Five of the homeowners proceeded with a remediation. Compliance with recommendations of the study varied from partial to full. The health status of the asthmatic occupants was monitored during the study. Health improvement of the occupants correlated qualitatively with the degree of improvement of the air quality of the houses.

CMHC Project Officer : *Virginia Salares* — *CIDN : 1621 0300002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SUPPORT FOR THE CONSORTIUM FOR MATERIAL EMISSIONS AND INDOOR AIR QUALITY MODELING

CMHC is an active supporting member on the steering committee and technical committee of a consortium established by the National Research Council, Institute for Research in Construction to develop protocols for testing materials and furnishings and for modeling the impact of those emissions on indoor air quality. Funds are being used to increase the database of materials tested to the new standards, in a house being built on the NRC campus.

CMHC Project Officer : *Virginia Salares* — *CIDN : 1244 0200004*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

INDOOR ENVIRONMENT

TOWARD THE USE OF VOLUNTARY INITIATIVES FOR ACHIEVING HEALTHY INDOOR ENVIRONMENTS IN CANADA

CMHC is participating in this partnership initiative developed and led by Pollution Probe. The objective of this project is to establish the current state of regulation of the indoor environment - residential, commercial and institutional - in Canada and to identify barriers and approaches to enabling the promotion and achievement of healthy indoor environments. The project will review and analyse existing regulatory and voluntary programs which have an impact on the indoor environment, both in Canada and internationally. The project scope will cover four distinct areas - buildings, products, services and processes, and seek to identify barriers to the creation of healthier indoor environments, gaps in present knowledge, and opportunities for voluntary initiatives. Through consultation with industry, government and other key stakeholders, the most instructive initiatives will be evaluated to identify key success factors and for their potential as voluntary initiatives which could compliment and/or supplement existing regulatory measures.

CMHC Project Officer : *Thomas Green*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2106 0200001
STATUS : Ongoing Project

LIGHTING

TESTING THE ADEQUACY OF RESIDENTIAL LIGHTING IN A CARE CENTRE: NEW AGE-ADJUSTED NORTH AMERICAN ILLUMINATION STANDARDS

The objective of this research is to undertake a field study on the effectiveness of lighting in two residential centres with remarkably different lighting levels.

CMHC Project Officer : *Virginia Salares*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2020 0200001
STATUS : Ongoing Project

COMPARISON OF THE NATIONAL BUILDING CODE, CAN/CSA-Z240 MH AND HUD PART 3280 MOBILE HOME

In Canada, mobile homes are usually built to the CAN/CSA-Z240 MH standard, (Z240). The National Building Code, (NBC), forms the basis for regulating all site-built housing. In the United States, the mobile home industry operates under the Housing and Urban Development (HUD) code. The MHI of Canada (MHIC) has suggested that there may be situations where the NBC and its provincial equivalents or the Z240 standard have more stringent requirements than are required for occupant health and safety. MHIC also believes that there may be other approaches to the construction of housing that will deliver an equivalent unit of housing but at a reduced cost. CMHC, in association with MHI Canada and the Canadian Manufactured Housing Institute (CMHI), is undertaking a comparative study of practices under the three different approaches to examine if there are non-health and safety related code/standard differences that affect production costs.

CMHC Project Officer : *Doug Pollard* — *CIDN : 1939 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CONTRIBUTION TO DEVELOP A MULTILINGUAL DIRECTORY OF CANADIAN MANUFACTURED HOUSING COMPANIES

The objective of this project is to develop a multilingual directory of Canadian manufactured housing companies.

CMHC Project Officer : *Louis Musto* — *CIDN : 2098 0900001*

Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

LAND USE ISSUES IMPEDING THE PROVISION OF AFFORDABLE HOUSING WITH MOBILE HOMES

The study will summarize the manufactured (mobile) home legislative environment across the U.S. and Canada, identify legislative and land use impediments blocking improved market share on the part of the Canadian industry, analyse the relevance of the pro-active U.S legislative environment as a paradigm for Canadian legislative reform and develop suggestions for manufactured home land use and legislative development in Canada.

CMHC Project Officer : *Doug Pollard* — *CIDN : 2154 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

MANUFACTURED HOUSING

MANUFACTURED HOUSING CONSULTANTS' TRAINING PROGRAM

The objective of this partnership project with the Canadian Manufactured Housing Institute is to develop and pilot a training program for retailers in the manufactured housing industry. This training will provide retailers with the skills, tools and knowledge on the technical, financial, regulatory and other aspects of their industry to better serve their clients effectively and professionally. CMHI will be responsible for overseeing the development and translation of the training material and delivery of the two-day pilot workshop session.

CMHC Project Officer : *Darrel Smith*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2196 0200001
STATUS : Ongoing Project

MOISTURE AND MOLD

FIELD TESTING OF MOISTURE IN STRAW BALE HOUSES

Straw bale construction is an innovative construction technique that is gaining popularity, particularly for rural houses. While these structures seem to be working well in the dry American southwest, the birthplace of the straw bale housing movement, it is unclear how well they will withstand extended periods of cold and damp conditions. The first set of tests looked at three small local investigations of straw bale house moisture content: one in several houses in Alberta/BC, one in older straw bale homes in the Gatineau area north of Hull, Québec and one in several houses in Nova Scotia. Reports are available from CMHC on the Gatineau and Nova Scotia sites, and from the CMHC project manager on the Alberta testing. Several of the houses showed high levels of straw moisture, particularly when probes were located near the exterior walls. Further monitoring and analysis is underway in both laboratory and test houses (listed as separate projects) to determine whether these occurrences will jeopardize the longevity of the straw.

CMHC Project Officer : *Don Fugler*
Division : *Research Division*
AVAILABILITY : *See above*

CIDN : 1867 030002,4
STATUS : Ongoing Project

GUIDELINES FOR MOISTURE MANAGEMENT IN EXTERIOR WALL SYSTEMS

The purpose of this project is to contribute to the development of guidelines for moisture management strategies for exterior wall systems to meet user requirements of long-term performance and durability for the wide range of climate zones across North America.

CMHC Project Officer : *Silvio Plescia* — *CIDN : 2199 0200001*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

MEASUREMENT OF THE HYGROTHERMAL PROPERTIES OF PLASTER AND STUCCO FOR STRAWBALE BUILDINGS

The objective of this project is to characterize the moisture performance of plaster and stucco over straw bales.

CMHC Project Officer : *Don Fugler* — *CIDN : 1867 0300007*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

MONITORING OF MOISTURE CONTENT OF STRAW BALE HOUSE WALLS AT THE EXTERIOR STUCCO

The purpose of this project is to monitor the moisture content of straw bale walls at the exterior stucco in 8 to 10 houses.

CMHC Project Officer : *Don Fugler* — *CIDN : 1867 0300005*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

MONITORING OF MOISTURE CONTENT OF STRAW BALE HOUSE WALLS AT THE EXTERIOR STUCCO

The purpose of this project is to monitor the moisture content of straw bale walls at the exterior stucco in four houses.

CMHC Project Officer : *Don Fugler* — *CIDN : 1867 0300006*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

PERFORMANCE EVALUATION OF WATER REPELLENTS FOR ABOVE GRADE MASONRY

The objective of this project is to evaluate the performance of various water repellents for above grade masonry on a comparative basis and develop practical methods to evaluate their effectiveness. This evaluation will be based on lab analysis and field testing as well as a literature review to find available information on water repellent performance. The initial part of this study, Phase I will be conducted under the CMHC External Research Program and will examine the issue of water infiltration while Phase II will examine exfiltration.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 1696 0300002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RAIN PENETRATION CONTROL SEMINAR

Water penetration is a frequent, recurring problem for building owners, leading to damage of building components, interior finishes and building contents. It frequently leads to high repair costs and possible litigation. Over the past few years, research undertaken by CMHC, has contributed to the understanding and the prevention of rain penetration. In particular the pressure-equalized rainscreen has been applied and refined. In this seminar the causes of rain penetration will be examined. The results of CMHC research will be presented, along with design features and practical details, which will help prevent rain penetration in a variety of wall types. This full day seminar is targeted to architects, engineers, specifiers, builders, developers and building owners concerned about rain penetration and how to prevent it. The seminars will be presented in Toronto, Winnipeg, Edmonton, Vancouver, Montreal and Quebec City. This seminar was developed in cooperation with the Canadian Masonry Association, the Canadian Precast Concrete Institute and the Exterior Insulated Finish Systems (EIFS), curtain wall and steel manufacturers.

CMHC Project Officer : *Jacques Rousseau* — *CIDN : 0838 0303005*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication will not be published*

RE-INSULATION OF EXISTING FLAT-ROOF MULTI-FAMILY BUILDINGS IN QUÉBEC

A joint project with Hydro Québec to examine ways of re-insulating low-rise multi-family buildings for energy efficiency, without causing moisture problems in the attic. Field testing was complete in early summer 1997. A final report was prepared. Hydro Quebec has not yet released it to the public.

CMHC Project Officer : *Don Fugler* — *CIDN : 1377 0801001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

MOISTURE AND MOLD

STUDY OF RECURRING MOLD PROBLEMS ON THE ROSEAU RESERVE IN MANITOBA: PHASE TWO

The first phase of the project dealt with an investigation of eight houses on the Roseau River Reserve. Some of these houses had been remediated following the flood in 1997. Moisture problems were of a chronic nature, not directly related to flooding. Remediation and clean-up was found to be ineffective. This report is available.

The second phase of the project consists of developing an information kit for First Nations. The kit will assist First Nations to recognize when there is a mold problem and to take the necessary steps to deal with the problem. The report will be available in winter, 2000.

CMHC Project Officer : *Virginia Salares* — *CIDN : 2036 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

NORTHERN HOUSING

FOUNDATION SYSTEMS FOR USE IN PERMAFROST AREAS

The purpose of this project is to conduct a study on foundation systems for use in Northern permafrost and intermittent permafrost areas. The study will assemble, document and analyse all data possible from literature searches and from the field on all known foundation systems used in the north. The final report will include a decision making tree to enable communities, homeowners, builders and renovators to make informed and appropriate choices in foundation systems.

CMHC Project Officer : *Darrel Smith* — *CIDN : 2133 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

INNOVATIVE FOUNDATIONS, HEATING AND VENTILATION

This R&D&C (research, development, commercialization) project and first stage monitoring is complete and a report due before the end of 1998. CMHC, Yukon Housing Corporation (YHC) and Yukon Energy partnered in building two research/demonstration houses in Dawson City, Yukon. This work is a continuation of previous successes in R&D&C of the space frame foundation technology now being exported to Alaska. The thrust of the current foundation work is to reduce cost, develop a technology that can be locally manufactured and reduce the height of the crawl space.

A torque tube HSS steel section is under one house. The other house will be an extension of the sheet metal reinforced plywood monocoque technology resting on three bearing points. Lots of ground movement has been reported so the test site is proving to be a good demonstration. After a review of northern and remote technology, the heating and ventilation systems incorporate and optimize energy efficiency, minimal equipment and sustainable ventilation operation. Construction is complete and the houses are occupied. Commissioning of the project was a large task and the systems appear to be running efficiently at about half the energy consumption of a typical northern house. The mechanical technology was used on another YHC project at substantial capital savings and with some modifications appears to be the technology of choice. Work is underway to develop a more cost effective and simple foundation system.

CMHC Project Officer : *Rob Duncan*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1676 0300001
STATUS : Ongoing Project

NORTH WEB-SITE

The purpose of this partnership project was to design, establish and maintain a dedicated NoRTH Web-Site for a two year period. The project partners are CMHC, Alaska Housing and Finance Corporation, and Yukon College. The web-site includes relevant technical information such as factsheets of research reports and the Frostline newsletter. It also includes discussion groups to provide a means of ongoing and current communication. The web-site has links to other relevant web-sites and can be visited at www.NoRTH-RTHN.org. The web site is updated with new articles and factsheets from time to time.

CMHC Project Officer : *Darrel Smith*
Division : *Research Division*
AVAILABILITY : *Publication will not be published*

CIDN : 1886 0200001
STATUS : Ongoing Project

HEALTHY HOUSING RENOVATION PLANNER: RENOVATE THE HEALTHY WAY

The "Healthy Housing Renovation Planner" is a step-by-step workbook to planning a healthy renovation.

Chapter One explains the links between your home, your health and the environment. It presents the key principles of Healthy Housing - contributing to occupant health, reducing energy consumption, conserving natural resources, minimizing environmental effects and balancing cost and practicality.

Chapter Two discusses the health effects of indoor air quality, with special attention to environmental hypersensitivities. A Home Health Checklist guides you through your home to help you identify sources of air quality problems - and solutions to them.

Chapter Three discusses the importance of up-front planning, walking you through the things you should think about before you begin your project. It describes the "house as a system", how you can renovate according to Healthy Housing principles and how you can get the most for your renovation dollar. Chapter Three will help you determine whether you have the skills and the time to do the job yourself. If you decide to hire a professional, Chapter Three gives you the information you need to choose the renovator who is best for you. The Chapter also discusses the critical importance of a written contract, insurance, building codes and by-laws and ways to minimize inconvenience while a project is under way.

The rest of the Renovation Planner deals with typical renovations, both large and small. In each chapter, you'll find several steps to help you plan a healthy and affordable project. Each chapter focuses on key issues involved in the renovation project: taking stock of the part of the house to renovate, evaluating options and strategies for making changes, and making a plan.

There are charts and checklists throughout the Renovation Planner so you can record your observations and your choices . Project planning worksheets help you assemble all the parts of the puzzle in one place. Lists of publications provide you with additional information on the subjects discussed.

Ottawa: Canada Mortgage and Housing Corporation, 1999. 320 pages.

Order number: NE2172 **Price: $34.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
P.O. Box 35005
Stn BRM B
Toronto, Ontario M7Y 6E5
1-800-668-2642
Fax orders from Canada: 1-800-245-9274
International clients see page 9 for order instructions.

HOW HEALTHY IS YOUR HOUSE: CMHC HOMEOWNER'S AND HOMEBUYER'S CHECKLIST FOR MAINTENANCE AND REPAIR

The current CMHC's Homeowner's and Homebuyer's: Inspection Checklist for Maintenance and Repair is being revised to both update and include a Healthy Housing evaluation "tool". It will provide homeowners and homebuyers with a pre-purchase or pre-renovation guide for performing an inspection on their house. Physical condition, IAQ, energy and environmental and maintenance and repair information will be included in the document. It will be beneficial in enabling consumers to make more informed decisions prior to hiring the assistance of a private home inspector should the need arise. This advisory document will be available early in 2000.

CMHC Project Officer : *Darrel Smith* *CIDN : 1901 0200001*

Division : *Research Division* *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RENOVATION OF GENERIC HOUSING STYLES - POST-WAR ONE-AND-A-HALF STOREY

The objective of this project is to provide consumer information on typical approaches to the repair and renovation of post-war one-and-a-half storey houses. Criteria for these approaches will include occupant lifestyle and needs, structural and maintenance requirements, "Healthy Housing" improvements (including environmental and energy-efficiency), and the impact on home equity and resale value. CMHC is preparing the document for publication in late 1999.

CMHC Project Officer : *Don Fugler* *CIDN : 1430 0200001*

Division : *Research Division* *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RENOVATOR TRAINING IN CANADA: AN EVALUATION AND SITUATION REPORT

The purpose of this project was to investigate the current situation with respect to renovation contractor training in Canada. A situation report was produced to determine who else is providing training for the residential construction industry with a focus on the renovator. Other issues related to this include marketing, financing, existing materials, relationship to certification, native initiatives, and options for delivery that reach beyond current CHBA membership, (i.e.: community colleges, private firms, etc.). The format and method of delivery was also researched (i.e.. five day, correspondence, computer-based, etc.). Recommendations presented in the study have been reviewed with industry and options for their implementation are being considered.

STATUS : *Completed*

AVAILABILITY : *Publication will not be published*

THE CANADIAN ASSOCIATION OF HOME AND PROPERTY INSPECTORS INITIATIVE

CMHC is assisting the private home inspection industry in Canada establish a minimum national standard of performance. The Canadian Association of Home and Property Inspectors (CAHPI) is a newly formed national association comprising a number of national and provincial home inspection associations, including some of the major franchises, and a number of independent inspection firms. CAHPI currently represents over 600 private home inspectors, but it is anticipated that other, non-affiliated private home inspectors will increase this number in the future. Concluding formal agreements with associations and establishing future national requirements are currently in progress. A CAHPI Board has been established and is setting-up and determining the responsibilities of the various committees such as, By-Laws, Accreditation and Certification, Strategic Relations, Education, Standard of Practice and Code of Ethics, and Discipline. CAHPI is working with the Alliance of Canadian Building Officials Association (ACBOA), which represents public building officials across the country, to submit a joint proposal to Human Resources and Development Canada requesting assistance to undertake an occupational skills analysis for both sectors of this industry.

CMHC Project Officer : *Darrel Smith*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1962 0200002
STATUS : Ongoing Project

THE CANADIAN RENOVATION INDUSTRY AND THE INTERNET: USAGE PATTERNS, 1998-2001

The objective of this project is to survey renovators about their use of e-mail, web-sites, and interactive online communications.

CMHC Project Officer : *Darrel Smith*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2015 0200001
STATUS : Ongoing Project

ACTION PLAN FOR REDUCING GREENHOUSE GASES IN RURAL COMMUNITIES

The purpose of this project is to prepare an integrated planning strategy that would provide guidance for rural municipalities across Canada facing the challenges of developing action plans for achieving Kyoto targets for reducing greenhouse gas (GHG) emissions. A rural Canadian communit that will be developing an action plan for reducing GHGs will be selected for study. Funding will be directed to documenting the development of the action plan to ensure that the appropriate actions are considered, implemented, monitored and the results disseminated. The objective is to provide an innovative, comprehensive planning approach for rural communities that integrates transportation planning, land use planning, new housing and retrofits, waste management, economic development and the regulatory environment.

CMHC Project Officer : *Susan Fisher*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2105 0200001
STATUS : Ongoing Project

CENTRE iSci: PARTICIPATION AND HOUSING EXHIBIT IN THE MONTREAL INTERACTIVE SCIENCE CENTRE AT THE VIEUX PORT

CMHC is participating in an Interactive Science Centre (Centre iSci) which will be created as part of the restoration of the Old Port of Montreal and will open in May 2000. The Centre's exposition of the science and technology of twelve industrial sectors will expose the visitor to the concepts, potential and challenges of each sector through highly interactive exhibits, multimedia displays and electronic connections to other national and international resources. Its goal is to foster creative and curious attitudes in the visitors, provide knowledge of natural processes and principles underlying each sector and present issues of importance to the next generation to improve their ability to seize the opportunities of the future. The theme of CMHC's participation and exhibition in the Habitat sector will be Healthy Housing and sustainable design. Links will also be made to other represented sectors which have implications for housing such as transportation, communication and medicine.

CMHC Project Officer : *Thomas Green*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2148 0200001
STATUS : Ongoing Project

COMPARISON OF COSTS AND RESOURCE-EFFICIENCY OF SEVEN RESIDENTIAL LANDSCAPE OPTIONS

This research study is to quantify and compare the annual horticultural inputs (i.e. materials), time, costs and environmental impacts associated with maintaining seven different landscape types. After annual inputs are determined, the capital and life-cycle costs for a typical residential lot will also be calculated. The seven landscape types will include (in post-establishment growth states): wildflower meadow/prairie; naturalized woodland/shade garden; xeriscape; lawn area with hardy, low maintenance species; manicured lawn with conventional species; ornamental shrubs and trees; and annuals and perennial borders. The study will assess the potential environmental impacts of each option as well as their aesthetic and functional implications. In addition, potential benefits, such as wildlife habitat, bio-diversity and reduced storm water run-off will be identified and quantified. The final product will be a publication intended for municipal decision makers, advisors in planning and environmental management departments, homeowners and property managers. It will show how they can save resources, reduce environmental impacts, as well as save money and time through reductions in horticultural inputs.

CMHC Project Officer : *Susan Fisher*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1976 0200001
STATUS : Ongoing Project

CONSTRUCTION RESOURCE MANAGEMENT COURSE - PHASE II

A private and public sector consortium has been established to develop a methodology for assisting industry to better understand, control and reduce the levels of construction, renovation and demolition (CRD) waste. To date, the partners include Industry Canada, Canada Mortgage and Housing Corporation, Alberta Environmental Protection, NWT Department of Resources, and PCL Constructors Canada Inc. Phase I was the development of a CRD training course in hard copy. The course provides practical and comprehensive information on resource management issues in the Canadian CRD industry. It is intended for project managers which include, but are not limited to: engineers, architects and CRD contractors. Phase II will consist of an Internet based CRD project management course that will: provide current resource management information and case-specific solutions; contribute to the development of standard managerial practice; promote widespread communication of the best resource recovery techniques, contribute to economic growth and job creation; promote long-term behavioural change; and help industry associations and government departments meet mandated environmental targets. The project is planned for completion in 2000.

CMHC Project Officer : *Darrel Smith*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2032 0200001
STATUS : Ongoing Project

DEMONSTRATION OF HEALTHY HOUSING ON RESERVE

This project formerly reported as "Water and Sewage Disposal in Northern and Remote Locations" will now form part of the Northern Healthy Housing initiative. The objectives are to support the design, construction and demonstration of eight on-reserve Healthy Houses in Quebec, Ontario, Manitoba and the Northwest Territories, during 1999-2000. This initiative will demonstrate alternative Healthy Housing designs with features appropriate for remote communities. Alternatives to conventional energy and water supply and sewage disposal infrastructure will be researched, including a prototype HUM (Heating and Utilities Module) that can serve a single house or a group of houses. The design of several houses is about to be completed (bungalow, one-and-a-half storey house), and working groups from the community will review the process. Construction will commence in the spring of 1999, with the public demonstration beginning in the fall of 1999. The houses will be built by locally trained trades and specialists. A CMHC report will be produced detailing the costs and benefits of the houses, designs and systems upon completion of the project.

CMHC Project Officer : *Chris Ives* — *CIDN : 1969 0200001-2*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

DESIGN AND TEST OF A PROTOTYPE UTILITIES MODULE

The objective of this project is to design and test a prototype utilities module (with interfaces suitable for hookup to a demonstration Healthy House in the First Nation community of Eagle Lake, Ontario).

CMHC Project Officer : *Chris Ives* — *CIDN : 2156 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

HEALTHY HOUSING SEMINAR

A two and a half hour consumer Healthy Housing seminar, with a renovation focus, has been developed and packaged for delivery. The material was based on existing material produced by the CMHC Ontario and British Columbia Regional offices. It was also updated to include recent research and to give it a national scope. Examples of case studies were included by incorporating material from the 1994 and 1996 Renovation Demonstration projects. CMHC is currently negotiating a partnership with the building supply industry for delivery of these seminars. The seminars are being offered now in Quebec in partnership with Reno Depot. They will be held in other parts of Canada starting in the fall/winter of 1999/2000. Presenters will be from industry and the training staff of CMHC's retail partners.

A condensed 30-minute presentation of the Healthy Housing Seminar was also produced. This material can be used at home builder association meetings, various industry shows and conferences and also in the preparation of background documents.

CMHC Project Officer : *Darrel Smith* — *CIDN : 1906 0200001*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication will not be published*

JOINT RESEARCH BETWEEN CMHC AND KHI TO DEVELOP SUSTAINABLE PLANNING AND CONSTRUCTION GUIDELINES FOR KOREAN COUNTRY STYLE HOUSING DEVELOPMENT

The purpose of this project is to develop sustainable site planning and construction guidelines through a specific site near Seoul, Korea.

CMHC Project Officer : *Jay Thakar*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

LANDSCAPE CASE STUDY ARTICLES: DEVELOPMENT OF CONSUMER INFORMATION MATERIALS ON SUSTAINABLE COMMUNITY PLANNING

The purpose of this project is to develop a series of articles highlighting homeowners with resource-efficient, low-maintenance landscapes to encourage readers to consider adopting sustainable and time saving alternatives. Three articles will be published in community newspapers in each of Canada's five regions.

CMHC Project Officer : *Susan Fisher* — *CIDN : 2158 0200001*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

OVERCOMING THE BARRIERS TO SUSTAINABLE REAL ESTATE DEVELOPMENT IN CANADA

The research will establish the features or framework by which a community might be deemed to be considered sustainable. Using this analytical framework it will develop a clear picture of the status of sustainable development in Canada and the barriers being faced in the implementation of sustainable communities. It will develop a parallel analysis of successful international projects focusing on those which successfully address problems encountered in Canada and from this comparison generate potential directions which might assist Canadians in overcoming barriers to sustainable real estate development.

CMHC Project Officer : *Doug Pollard* — *CIDN : 2051 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

PLANNING SUSTAINABLE COMMUNITIES

The purpose of this project is to develop an updated advisory document on community planning and design. The updated document is intended to be a state-of-the-art report, reflecting the latest thinking in the field. The emphasis of the document will be on presenting practical examples (best practices and case studies) of innovative, sustainable and cost-effective approaches to community planning and design. Final report is in production.

CMHC Project Officer : *Brian Eames* — *CIDN : 1553 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

PROTOTYPE HEALTHY HOUSE AT ROSEAU RIVER RESERVE IN MANITOBA

The objective of this study is to undertake and complete the conceptual design, construction drawings and inspections for a Prototype Healthy House at Roseau River Reserve in Manitoba.

CMHC Project Officer : *Chris Ives* — *CIDN : 2036 0200002*

Division : *Prairie Region Business Centre* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RESIDENTIAL GREENWAYS IN TRANSITION: FOUR DECADES OF PRACTICE IN WATERLOO

This research examines the evolution and assesses the merits of residential greenways employed in the City of Waterloo over the past four decades.

CMHC Project Officer : *Susan Fisher*

Division : *Research Division*

AVAILABILITY : *Publication is not available*

CIDN : 2144 0200015

STATUS : Ongoing Project

RYDER LAKE "URBAN VILLAGE": DEVELOPMENT PLAN FOR A SUSTAINABLE COMMUNITY = LE VILLAGE URBAIN DE RYDER LAKE : PLAN D'AMÉNAGEMENT POUR UNE COLLECTIVITÉ DURABLE

Chilliwack, a community of sixty-five thousand located in British Columbia's Lower Mainland region, has responded to the challenge of accommodating a fast-growing population in an environmentally responsible manner by launching a project to build a sustainable community or "urban village" on 2,500 hectares in the adjacent hillside area of Ryder Lake. Recognizing the groundbreaking nature of such an initiative, in fall 1994, the ACT Program awarded the District of Chilliwack's Municipal Development Department a grant to be used towards the preparation of a plan, including development policies, standards and guidelines, for a high-density, compact community of approximately 40,000 people. A related goal of this project was to create an efficient approvals process for permit applications for development in Ryder Lake.

This ACT project resulted in the preparation of the Ryder Lake Area Plan ("The Plan"). The Plan proposes the use of a combination of flexible regulatory tools to guide the development of the Ryder Lake sustainable community. As a starting point, the District designated the entire Ryder Lake area as a "Development Permit Area" under the Municipal Act. This approach allows the District to protect the natural environment and to establish guidelines regarding the form and character of commercial and multi-family development. Furthermore, construction in Ryder Lake will be regulated by the application of performance standards rather than conventional prescriptive standards which are typically used to control suburban development. By focusing on the objectives and intent of the design, performance standards provide municipal authorities with an acceptable amount of control over the development process while, at the same time, enabling developers to build in a more creative manner.

The goals of the ACT Program - improving housing affordability, choice and quality through regulatory change - are clearly reflected in the development of sustainable communities such as Ryder Lake. The results of this project are very much applicable to other communities wishing to plan growth and development in a way that enriches the lives of its citizens while respecting the environment.

Affordability and Choice Today (A.C.T.) Demonstration Project / District of Chilliwack, British Columbia. Prepared by Julie Tasker-Brown. Prepared for: Federation of Canadian Municipalities, Canadian Home Builders' Association, Canadian Housing and Renewal Association, Canada Mortgage and Housing Corporation. Ottawa: The Federation; The Associations; CMHC, 1998.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

SUSTAINABLE COMMUNITY DESIGN

This project sought to identify the features of a sustainable community and how they can be applied to the design of a new community. Several Canadian and international examples of built or proposed communities were used to seek out theses features. It also tried to test consumer response to these design features by using images and facts from these example case studies and from a proposed design for a Canadian subdivision.

The study results are incorporated in a CD-ROM. It presents 150 sustainability features organized in distinct categories ranging from the house scale to the large community level. Text and images describe each feature and its effect on sustainability. All features are linked to a set of case studies where they are shown with pictures, drawings or diagrams. A list of references supports each aspect of community design along with Internet connections to many original sources. This component of the disc provides an extensive and comprehensive check list of all the elements that need to be considered in the design of a sustainable community. The visual descriptions of these elements would assist a designer in setting a starting point for a planned new community.

Visualizing the attributes of a sustainable community can also help gauge consumer reaction. The disc includes a complete questionnaire, in a sequence of electronic images, that can be used as a means of exploring the market for innovative features which cannot be found and experienced in real life settings.

Prepared by Eduard Epp, Richard Perron, William T. Perks, Chris Sale, David van Vliet.

Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

NOTE: CD-ROM available by interlibrary loan only.

STATUS : *Completed Report*

AVAILABILITY : *Interlibrary Loans*
Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2365 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

SUSTAINABLE DESIGN CHARRETTE FOR THE SOUTH EAST FALSE CREEK NEIGHBOURHOOD OF VANCOUVER

This project will report on the rationale and results of a design charrette structured to test the viability of sustainable community development guidelines. The report will include a brief history of the guideline development, the reasons for holding a charrette, a synopsis of CMHC research that was used, a critique of the effectiveness and value of the charrette. The report will also include drawings done at the charrette itself.

CMHC Project Officer : *Doug Pollard*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2076 0200001
STATUS : Ongoing Project

SUSTAINABLE LANDSCAPE DESIGN FOR RESIDENTIAL DEVELOPMENTS

The objective of this project is to highlight the link between sustainable development for housing with the condition, composition and use of native vegetation.

CMHC Project Officer : *Susan Fisher*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1466 0200001
STATUS : Ongoing Project

SUSTAINABLE MUNICIPAL INFRASTRUCTURE DESIGN FOR A RESIDENTIAL DEVELOPMENT

This project's objective is to review current practices pertaining to suburban communities in Southern Ontario, Canada and in other parts of the world; consider alternative design options for subdivisions and provide practical and up-to-date recommendations for the incorporation of sustainable community features.

CMHC Project Officer : *Susan Fisher*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200021
STATUS : Ongoing Project

VIRTUAL REALITIES AS EVALUATIVE SUSTAINABLE COMMUNITY DESIGN CRITERIA

The objective of this project is to identify appropriate design criteria and develop, test and evaluate a method for determining consumer receptivity to sustainable community design using a series of virtual reality simulations. The criteria and simulations will be recorded on a CD-ROM to assist designers and developers in finalizing community designs and in convincing officials and public about the merits of such designs. Publication is expected in the spring of 2000.

CMHC Project Officer : *Fanis Grammenos* — *CIDN : 2013 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

CASE STUDIES OF POTENTIAL APPLICATIONS OF INNOVATIVE RESIDENTIAL WATER AND WASTEWATER TECHNOLOGIES

Objectives of this project were to identify and describe opportunities for use of innovative water supply and wastewater systems for residential buildings, to compare costs and benefits of traditional and innovative systems, and to propose solutions that could lead to more cost-effective and environmentally friendly housing. The innovative technologies considered are those used in the Toronto Healthy House: a rainwater cistern system, and recycling of all household wastewater, for non-potable uses. In five case study sites in Nova Scotia, life cycle costs of these technologies were compared with costs of traditional infrastructure alternatives -- municipal water and wastewater, or wells and on-site sewage disposal systems. These comparisons indicate that the Healthy House technologies could be cost-competitive in an urban or suburban subdivision if fire protection is not required; a non-urban area as an alternative to a cluster system, or in a non-urban area as an alternative to a remedial central system. Other situations where they might be appropriate are also discussed. Other non-cost issues -- technological, management, regulatory, and public and political -- that must be considered if these technologies are to be adopted are identified and discussed. Recommendations are offered about strategies and actions that can take advantage of opportunities and address problems and issues related to adoption of innovative technologies for residential water supply and wastewater management.

Prepared by D.H. Waller, M.A. Salah, Centre for Water Resources Studies, DalTech. CMHC Project Officers: Peter Russell, Stéphanie McFadyen. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

DEVELOPMENT OF A RESIDENTIAL WATER USE MODEL

The first phase of this project developed a user-friendly computer model that determines daily water consumption for a prescribed pattern of water use in a house that incorporates facilities to treat and reuse grey water. The program will be of value to designers of innovative residential plumbing systems. Its first application was in the design of the water system for the Toronto Healthy House and the Conservation Co-op apartment building in Ottawa. This second phase of the project saw the revision of the WaterSave program to more realistically represent water quality and account for contamination concentration build-up in the recycled water. Sample reuse situations were also accounted for in the revised model and the user's manual was updated. The consultants are in the process of exploring opportunities for marketing the software.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 1422 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication will not be published*

ECONOMIC FEASIBILITY STUDY OF WATER REUSE AND TREATMENT TECHNOLOGIES

The purpose of this project is to undertake and complete an economic feasibility study of water reuse and treatment technologies. The contractor will assess ten case studies of on-site water reuse applications. Final draft is expected by the end of August.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 2089 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

GREYWATER TECHNOLOGY SOFTWARE DEVELOPMENT

CMHC is participating with Water Technology International in this research project to further develop the TECHSPEX software package to address water use, reuse and treatment. This product will provide a number of technical solutions to onsite or small community water treatment requirements based on user needs. Costs for the items specified and product availability are also included in the software development.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 1927 0200*

Division : *Research Division* — *STATUS : Completed*

AVAILABILITY : *Publication will not be published*

HOUSEHOLD GUIDE TO WATER EFFICIENCY

Based on a highly successful document by the Region of Durham, this project will create a Canadian Water Efficiency Guide for homeowners. The document requires further research of national water use and pricing statistics, regional water needs, and regionally appropriate information on xeriscaping. The completed version will be available in hard copy and a CD version for individual municipalities to produce and disseminate it.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 2238 0200*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

LIVING BY WATER GUIDEBOOK

The objective of this project is to prepare, publish, market and distribute a guidebook for waterfront residents on reducing environmental impacts of housing on aquatic and shoreline habitat.

CMHC Project Officer : *Susan Fisher* — *CIDN : 2040 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

ON-SITE STORMWATER MANAGEMENT ALTERNATIVES

This study will provide practical information to municipalities and developers to encourage them to adopt stormwater management alternatives both at the lot and community level. It will examine the costs and benefits of practical solutions as well as the barriers to implementation through a series of case studies.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 2087 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

ON-SITE WATER REUSE QUALITY AT QUAYSIDE VILLAGE CO-HOUSING CORPORATION

The water reuse system at Quayside village has been completed. Preliminary testing is under way and the monitoring program should start by Fall '99.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 1991 0200003*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

QUAYSIDE VILLAGE GREYWATER DEMONSTRATION PROJECT

A greywater system similar to that of the Toronto Healthy House system is being implemented into a 19 unit cohousing project in North Vancouver, B.C. This system will be capable of treating greywater from sinks, laundry, and showers for reuse in showers, laundry and toilets. Initial testing will be restricted to toilet reuse only. Double plumbing has already been installed and the greywater system is being installed following the signing of a contractual agreement between the city and development regarding ongoing monitoring and maintenance. Upon completion the system will be subject to continuous online water quality monitoring and laboratory analysis to ensure that both the system and the online monitoring is working to satisfaction. The system is now working and monitoring is underway.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 1991 0200*
Division : *Research Division* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

SUSTAINABLE HOME WATER SYSTEM

The objective of this research is to develop a system which will collect rain water for non-potable uses in a house plus a grey water heat recovery and recycling system.

CMHC Project Officer : *Cate Soroczan* — *CIDN : 1224 0200001*
Division : *Housing Technology Incentives Program* — *STATUS : Ongoing Project*
Research Division
AVAILABILITY : *Publication is not available*

SUSTAINABLE HOME WATER SYSTEM AT THE ALBERTA SUSTAINABLE HOME/OFFICE

The objectives of the Sustainable Home Water System (SHWS) project were:

- to design an autonomous home water system which includes a rainwater collection, storage, and treatment system; greywater heat recovery; and a greywater treatment and recycling system;
- to install the SHWS at the Alberta Sustainable House as a demonstration prototype;
- to monitor and evaluate the performance of the SHWS and greywater heat exchangers; and
- to determine the SHWS viability in the Canadian housing industry as a retrofit and for new home installations.

The Sustainable Home Water System (SHWS) at the Alberta Sustainable Home/Office reduces total residential water use by 78% compared with average Calgary households.

Collected rainwater is treated on demand to satisfy potable water requirements and meets Canadian Drinking Water Quality Guidelines (1996) for all parameters tested, however aesthetic objectives are slightly exceeded for temperature.

Heat from greywater is reclaimed through the counter current and drum storage greywater heat exchangers contributing 7.4% and 4.4% respectively to hot water heating. In-series operation accounts for 16.8% of the hot water heating required at the ASH home/office.

The greywater is treated using slow sand filters, soil box subirrigation, and a Greywater Garden Wall. The treated greywater conforms to non-potable water guidelines from several US states, apart from the elevated levels of total suspended solids. This reuse water satisfies 86% of the total ASH home/office water demand (i.e. ultra low flush toilet, bathing, clothes washing, and subsurface irrigation).

The Sustainable Home Water System is a cost-effective, environmentally-friendly, safe home water system which can easily be installed in new homes, and SHWS components can be incorporated into existing residential water systems. Maintenance and operation requirements are inexpensive and require limited time, however, a complete understanding of the system is required. Further research, monitoring, and adaptations to the water treatment system will be continued to improve the SHWS.

Prepared by Jorg Ostrowski and Karen Braun, A.C.E. - Alternative & Conservation Energies, Inc. CMHC Project Officer: Stéphanie McFadyen. Ottawa: Canada Mortgage and Housing Corporation, 1998. (Housing Technology Incentives Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road, Ottawa, Ontario, K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

WATER CONSERVATION, REUSE & MANAGEMENT

WATER RECYCLING DEMONSTRATION

The goal of this project was to produce a water recycling unit that is created from off the shelf components. Eight units in Ottawa's Conservation Co-operative are double plumbed for the reuse of treated shower water for toilet use. Analysis of the initial system indicated a number of design flaws. A second system is now up and running and performance monitoring is underway. Initial results indicate that the system is working well and water quality is meeting all requirements.

CMHC Project Officer : *Cate Soroczan* *CIDN : 1573 0200001*

Division : *Research Division* *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

Y2K

PREPARING YOUR APARTMENT FOR Y2K. ABOUT YOUR HOUSE SERIES; CE 20

This guide has been prepared to provide you with the necessary information to assess the degree to which the Y2K problem could affect your apartment and building. This guide focuses on the appliances, equipment and systems which provide for your health, comfort and security: local utilities, electricity, water, fresh air, electronic access systems and heating. Information regarding consumer goods such as VCRs, camcorders, stereos, televisions, and home computers can be obtained directly from the manufacturer or the store where you bought them.

Ottawa: Canada Mortgage and Housing Corporation, 1999.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

PREPARING YOUR HOME FOR Y2K. ABOUT YOUR HOUSE SERIES; CE 16

This guide has been prepared to provide you with the necessary information to assess the degree to which the Y2K problem could affect your home. This guide focuses on the appliances, equipment and systems which provide for your health and security: loss of electric power, loss of natural gas, loss of water supply, and communications. Information regarding consumer goods such as VCRs, camcorders, stereos, televisions and home computers can be obtained directly from the manufacturer or the store where you bought them.

Ottawa: Canada Mortgage and Housing Corporation, 1999.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
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International clients see page 9 for order instructions.

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SOCIAL AND ECONOMIC RESEARCH

ABORIGINAL HOUSING AND COMMUNITY SCENARIOS IN URBAN PRAIRIE CITIES

This research project will explore alternative futures for the housing situation of Aboriginal peoples in selected Prairie cities. The technique to be employed is to construct a number of future scenarios for each location, ready for presentation to a group of key people in each location. A wide range of inputs would be used to construct the scenarios. Three scenarios would be used for each location - each would have a theme or story line and the basic themes would be repeated at each location. While the themes of the scenarios would be common to each location, each scenario would be 'tuned' to account for local circumstance. Inputs would include, for example, demographic trends, local housing market conditions, and community plans and preferences as well as local opportunities.

CMHC Project Officer : *Philip Deacon*

Division : *Research Division* *STATUS : Planned*

AVAILABILITY : *Publication is not available*

ADDRESSING SPECIAL HOUSING NEEDS IN FIRST NATION COMMUNITIES

In the 1991 Census, the rate of disability reported by Aboriginal adults was twice as high as that in the Canadian population as a whole. Specifically in the area of housing, the report on the Round Table on Disabilities in First Nations Housing in 1993 referred to a range of problems including a lack of alternative housing, the need to review policies to identify barriers to service provision, and the inappropriateness of prevailing barrier free home designs for Indian reserves.

"Completing the Circle", the Standing Committee report on Aboriginal people with disabilities talked of the need for co-operation and support at the community level if the problems of disabled Aboriginal people are to be addressed. The Department of Indian and Northern Development evaluation of their contribution to the National Strategy for the Integration of Persons with Disabilities found that lack of information is the most significant barrier to First Nations people in finding the help they need.

Using the findings of these initiatives as a framework, as well as the findings of the Home Adaptations for Seniors Independence evaluation, this study profiles specific on-reserve communities in Atlantic Canada, identifying how they are addressing the housing needs of their disabled members, and on the basis of this, developed strategies and mechanisms for such communities to do it effectively. The report identified recommendations for action by stakeholder groups (Aboriginal organizations in partnership with government) and by individual First Nation communities themselves. It also provided an evaluation of the objectives of the project.

A common element among the recommendations is the need for First Nation disabled people to play a key role in all issues affecting them including: identifying needs, establishing criteria for assistance, making decisions, and being the advocating voice. Another common element is the need for First Nation communities to take a proactive planning approach to meet the special needs of disabled and elderly in their communities, incorporating their needs into the bigger picture of planning for the future of their communities.

The "Completing the Circle" report identified that there were major gaps and administrative problems in meeting the needs of disabled Aboriginals. This research confirmed that in Atlantic Canada First Nation communities there are still a number of problems related to these issues. In particular, this research found that there is concern about the inability, real or perceived, to access provincially funded programs to meet on-reserve needs and the uneven provision of basic support services across the communities.

Prepared by: Rural and Small Town Programme. David Bruce, Senior Associate and Tracey Weatherston, with John Higham and Judy Reid. Ottawa: Canada Mortgage and Housing Corporation, 1998.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and housing Corporation
700 Montreal Road, Ottawa, Ontario, K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

CORE HOUSING NEED AMONG OFF-RESERVE INUIT, MÉTIS, STATUS AND NON-STATUS INDIANS IN CANADA

This study, based on the 1991 Aboriginal Peoples Survey (APS) and 1991 Census, explores housing need among Inuit, Métis, Status and Non-Status Indian peoples living off-reserve. It profiles the factors that influence the high levels of core housing need experienced by each individual Aboriginal group.

The report brings to light two key conclusions regarding the overall incidence of Aboriginal housing need off-reserve:

- a large proportion of Aboriginal households located in northerly, remote areas of the country occupy housing that is crowded, in need of major repair and lacking adequate bathroom facilities. These physical housing problems are most commonly experienced in Labrador, the northern Prairies and the Northwest Territories; and,

- Aboriginal households are especially likely to fall into core housing need - that is lacking access to housing that is adequate in condition, suitable in size and affordable - in a number of urban areas in Western Canada, most because they are dedicating high proportions of their income to shelter.

Prepared by Ark Research Associates, Ark Research Manager: Aron Spector. Prepared for Research Division, Canada Mortgage and Housing Corporation. CMHC Project Manager: John Engeland. Ottawa: CMHC, 1998.

*Order Number PE0295 ** Price $12.95 + GST and handling charges.*

STATUS : Completed Report

AVAILABILITY : *CMHC Information Products*
P.O. Box 35005
Stn BRM B
Toronto, Ontario M7Y 6E5
1-800-668-2642
Fax order from Canada: 1-800-245-9274
International clients see page 9 for order instructions.

FEASIBILITY AND VIABILITY OF MANAGING THE POOLED REPLACEMENT RESERVE FUNDS OF FIRST NATIONS AND URBAN NATIVE HOUSING GROUPS

The objective of this project is to research and prepare a report which examines the feasibility and viability of managing the pooled replacement reserve funds of First Nations and Urban Native Housing groups.

CMHC Project Officer : *Tina Heal* *CIDN : 2084 1500001*

Division : *B.C. & Yukon Business Centre* *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

RISK MANAGEMENT AND INSURANCE IN ABORIGINAL COMMUNITIES: TWO CASE STUDIES

The cost of insurance is often three times higher in Aboriginal communities than in comparable non-Aboriginal communities. Previous research has shown that less than half of this extra cost can be justified because of the extra risks involved. This report describes two examples of Aboriginal communities who reduced the costs of their insurance through applying a risk management approach and competitive tendering. The 14 Inuit communities of the Kativik Regional Government in Nunavik achieved a decrease of 50% in cost, followed by a further reduction of 20% two years later. The scope of the coverage was improved with the same broker and insurance company as before. The Naskapi Band of Quebec took the same approach. It saved some 70% on the cost of insurance, while improving the quality of its coverage. Here the broker and insurance company changed. Risk management is a continuous and systematic series of activities with three distinct goals: to minimize the likelihood of accidents, to limit their severity, and to ensure that the pre-accident situation can be restored.

Ottawa: Canada Mortgage and Housing Corporation, 1999. 16 pages.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions

ABORIGINAL HOUSING

URBAN ABORIGINAL ACCESS TO HOUSING (AND HOMELESSNESS)

This research study will develop a survey instrument to measure the longitudinal profile of Aboriginal household mobility, access to housing and homelessness using a historical interview technique. Snapshot surveys tell us that Aboriginal households are significantly more mobile than non-Aboriginal. This hyper mobility includes not only movement between reserve or home community and urban areas, but also between urban areas and within urban areas. The hyper mobility may lead to frequent difficulties in accessing accommodation, especially when coupled with the low socio-economic status of many Aboriginal households and discriminatory practices of some landlords. Some literature suggest that this combination of circumstances could be a major factor leading to Aboriginal homelessness. About 45% of the Aboriginal population live in cities and this segment of the population is expected to grow by almost half by 2016, which will likely exacerbate the situation.

CMHC Project Officer : *Philip Deacon* — *CIDN : Plan 7-9018*
Division : *Research Division* — *STATUS : Planned*
AVAILABILITY : *Publication is not available*

CANADA MORTGAGE & HOUSING CORPORATION

EVALUATION STUDY OF CMHC'S DIRECTED RESEARCH

The objective of this project is to carry out an evaluation study of CMHC's directed research.

CMHC Project Officer : *Patricia Streich* — *CIDN : 2170 0500001*
Division : *Audit and Program Evaluation Services* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

HISTORY OF THE CMHC'S FIRST FIFTY YEARS: 1946-1996

The purpose of this project is to write a history of CMHC's first fifty years (1946-1996).

CMHC Project Officer : *Eric Tsang* — *CIDN : 2113 0600001*
Division : *Strategic Planning* — *STATUS : Ongoing Project*
Policy & Marketing
AVAILABILITY : *Publication is not available*

CANADA MORTGAGE & HOUSING CORPORATION

SUMMARY OF THE CORPORATE PLAN, CANADA MORTGAGE AND HOUSING CORPORATION 1999-2003 = RÉSUMÉ DU PLAN D'ENTREPRISE, SOCIÉTÉ CANADIENNE D'HYPOTHÈQUES ET DE LOGEMENT 1999-2003

This Summary of the 1999-2003 Corporate Plan for Canada Mortgage and Housing Corporation (CMHC) and the 1999 annual budget are required by the Financial Administration Act. The Summary briefly profiles CMHC, highlights key achievements for 1998 and discusses external factors affecting CMHC. The Summary also sets out how CMHC plans to meet its four corporate objectives from 1999 to 2003, and how CMHC's activities and their results will make a difference to Canadians. Finally, the Summary presents CMHC's financial plans and the resources it requires to carry out federal housing policy over the next five years.

Ottawa : CMHC = SCHL, 1999.

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

CHILDREN'S ENVIRONMENTS

ENVIRONMENTAL SCAN: CHILDREN AND POVERTY

This project will involve preparation of an environmental scan or background report on children and poverty, as it relates to housing. This document will include information on demographics, social and economic characteristics, key players, references and potential consultants, as well as housing circumstances for children's housing and living environments.

CMHC Project Officer : *Gloria Neufeld Redekop* *CIDN : Plan 7-6683*
Division : *Research Division* *STATUS : Planned*
AVAILABILITY : *Publication is not available*

BRINGING THE HABITAT AGENDA HOME

The purpose of this project is to publish a book to inform the membership and others in the Canadian Habitat NGO network about the outcome of the Habitat II Conference and the Habitat Agenda, as well as to provide information and ideas in order to facilitate the implementation of the Habitat Agenda.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1965 0900001
STATUS : Ongoing Project

DEMONSTRATION OF FULL-COST ACCOUNTING TOOLS AND TECHNIQUES

The objective of this project is to demonstrate the benefits of using full-cost accounting tools and techniques to evaluate the social, economic and environmental costs and impacts associated with urban growth and to analyse the full costs and impacts of growth in a selected infrastructure in areas of the Fraser Valley regional District as a case study. The final report will also describe state of the art of assessment methods and tools.

CMHC Project Officer : *Doug Pollard*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2127 0200001
STATUS : Ongoing Project

EFFECTS OF DEVELOPMENT CHARGES ON URBAN FORM: AN ECONOMETRIC STUDY

This econometric study examines the connections between development charges placed on residential construction and the spread and density of cities.

CMHC Project Officer : *David D'Amour*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1941 0200001-2
STATUS : Ongoing Project

GRANVILLE ISLAND: AN URBAN OASIS

Twenty years ago, Granville Island was transformed from a decrepit 37-acre industrial slum in Vancouver's False Creek to possibly the most successful urban redevelopment ever seen in North America. Rusty tin-sided factories were reborn as a public market, an art school, shops, restaurants, theatres, and a great deal more. Today, Granville Island boasts more than eight million visits a year, 2,600 jobs and the highest sales per square foot of any public market on this continent.

This book chronicles the Granville Island story, celebrates what the Island has to offer, and peers inside its seldom-seen inner life. It describes the Island's heritage, its transformation, attractions and amenities and its working life.

Prepared by Michael McCullough. Vancouver : Granville Island Office, Canada Mortgage and Housing Corporation, 1998.

** Price: $39.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *Granville Island Office*
Canada Mortgage and Housing Corporation
1661 Duranleau St., 2nd Floor
Vancouver, BC
V6H 3S3
Tel.: 604-666-6655
Fax.: 604-666-7376

LE PROGRAMME ÉCO-QUARTIER DE LA VILLE DE MONTRÉAL: UNE INNOVATION EN ÉVOLUTION

The Éco-quartier program was organized by the City of Montreal to involve its citizens in locally-based environmental initiatives. The purpose of this report is to evaluate the program so that readers from Montreal and all municipalities across Canada can benefit from lessons learned.

This innovative program responds to local environmental needs, most particularly collecting recyclable materials and greening the city. However, it has not addressed large-scale environmental problems such air pollution. In this regard, it has been more focused on issues that directly affect local citizens. Thus the mandate or scope has been somewhat limited.

Regarding its greening the city activities, a horticultural approach has been favoured over an ecological approach, i.e. beautification over biodiversification. Interviews reveal that participation in the activities by citizens has been weak on the design and maintenance of the planted sites, but that local citizens enjoy the initiatives and feel that they fill a social need.

To improve the program, the organizers should involve residents in all phases of the projects, favour use of public spaces over private lots, and make better use of partnerships. They should also expand the program to address other local environmental issues.

Prepared by Gilles Sénécal and Diane Saint-Laurent with the collaboration of Anne-Marie Charlebois and Daniel Léonard. CMHC Project Officer: Susan Fisher. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

COOPERATIVE AND NON-PROFIT HOUSING

BENCHMARKING PHYSICAL PLANT EXPENDITURES IN NON-PROFIT HOUSING

The objective of this project is to assess expenditures and practices related to the physical plant in non-profit housing providers.

CMHC Project Officer : *Duncan Hill* — *CIDN : 2003 0200001*

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

CRISIS SITUATIONS IN COOPERATIVES: INCREASING UNDERSTANDING TO IMPROVE INTERVENTION

This research project concerns crisis situations in housing cooperatives: the conditions in which they emerge, but especially the dynamics put in place to resolve them.

CMHC Project Officer : *Marie Murphy* — *CIDN : 2018 0200001*

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

CRIME PREVENTION

SAFE COMMUNITIES: INFORMATION PRODUCTS AND TRAINING MATERIALS

In partnership with the RCMP, CMHC is developing materials to promote the principles of crime prevention through environmental design (CPTED). Priorities were identified at a stakeholder forum held in the Spring of '97. Materials include case studies of success stories at the subdivision and community level, and the enhancement and adaptation of training materials for a variety of distinct audiences, including builders and developers. A draft advisory document has been prepared which will be reviewed and finalized in 1999.

CMHC Project Officer : *Mark Holzman* — *CIDN : 1938 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

DISCRIMINATION IN HOUSING

HOUSING AND DISCRIMINATION: A REVIEW OF CURRENT KNOWLEDGE

The objective of this research is to identify and examine what knowledge and expertise regarding housing-related discrimination is available in or applicable to Canada.

CMHC Project Officer : *Teresa Van Den Boogaard* *CIDN : 1792 0200001*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

HOUSING AND DISCRIMINATION: THE LEGAL FRAMEWORK

The purpose of this project is to examine housing related discrimination from a legal perspective and to understand how housing-related discrimination fits in Canada's legal framework.

CMHC Project Officer : *Teresa van den Boogaard* *CIDN : 1793 0200001*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

HOME OWNERSHIP

CONSUMER EDUCATION & COUNSELING MEASURES USED TO FACILITATE & SUSTAIN ACCESS TO HOME OWNERSHIP

The objectives of this project are to review and assess the nature, scope, operation and results of US consumer education and homeowner post-purchase counseling initiatives aimed at facilitating affordable and sustainable access to homeownership and then to compare this to the current state of affairs in Canada. In the U.S. an increased emphasis has been placed on providing pre-purchase home buyer education and post-purchase counseling in order to mitigate the perceived higher default-risk associated with homeownership loans to lower income households. In recognition of the value of such counseling, HUD offers mortgage insurance premium reductions to households successfully completing such programs. This project will be of interest to organizations involved in facilitating, supporting, and sustaining household's access to homeownership.

CMHC Project Officer : *David Metzak* *CIDN : 2122 0200001*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

HOMEOWNER'S MANUAL

The Homeowner's Manual was designed to provide builders with a tool to reduce the time and cost of customer callbacks. Builders can now provide their clients with a Homeowner's Manual filled with practical, easy-to-read information on operation and maintenance customized for their new home.

The Homeowner's Manual is a print-on-demand product to allow for customization. It is divided into three sections covering:

1) customized information based on the particular specifications of the individual home (e.g. type of roofing, foundation ...)

2) generic home care information, seasonal maintenance charts ...

3) a plastic sleeve for inclusion of the New Home Warranty, home plans ...

The Homeowner's Manual is endorsed by the Canadian Home Builder's Association (CHBA) as well as the Canadian New Home Warranty Council (NHWC). Builders who are members of the CHBA or provincial members of the NHWC will have the appropriate association logos printed on the cover of the product.

Builders who purchase this manual for their customers will be providing outstanding customer service, enhancing their professional image and reducing after-sales service costs.

The primary benefit to homeowners is a customized and comprehensive permanent reference tool to help them operate and maintain their new home. It has easy-to-follow text, lots of clear illustrations and environmental, money-saving and health tips.

Ottawa: Canada Mortgage and Housing Corporation, 1999.

Order number: NE2322 **Price: $39.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

HOME OWNERSHIP

METHODS USED ABROAD TO SUPPORT ACCESS TO HOME OWNERSHIP

The objective of this research is to investigate significant and novel mechanisms which other nations have employed, encouraged and/or are considering that support and facilitate access to home ownership in general or to target populations. The intent is to identify new mechanisms that might be implemented in Canada that hold promise to improve access to home ownership. The review will cover the U.S., U.K., Germany, France, Australia and New Zealand. This project will be of interest to the construction and renovation industry, the real estate sales sector, mortgage lenders and insurers as well as federal and provincial housing policy analysts.

CMHC Project Officer : *David Metzak* — *CIDN : 1931 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

STUDY ON THE PREFERENCES OF GENERATION X IN TERMS OF HOUSING

The purpose of this project is to determine the factors that keep the younger generation in rental housing and the ones that attract them to buy; and to conduct seven group discussions: four in Montréal; two in Québec and one in Sherbrooke. The information will be presented at a conference.

CMHC Project Officer : *Jean Laferriere* — *CIDN : 2139 1000001*

Division : *Market Analysis Centre* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

HOMELESSNESS

ROUNDTABLES ON BEST PRACTICES ADDRESSING HOMELESSNESS

CMHC co-hosted five regional roundtables in April 1999 and a national roundtable in June 1999 on best practices addressing homelessness, using the "Best Practices Addressing Homelessness: Documentation" as a basis for discussion. The regional roundtables were co-hosted by CMHC and local homelessness organizations. The roundtables were effective opportunities for network building and exchange of information on effective best practices. A final document was prepared containing brief summaries of the six roundtables and "regional backgrounders" on key homelessness issues, prepared by the co-host homelessness organizations.

CMHC Project Officer : *Gloria Neufeld Redekop* — *CIDN : 2064 0200*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SERVICES FOR CHILDREN AND YOUTH IN CANADIAN SHELTERS FOR HOMELESS FAMILIES

This project will investigate the availability and viability of space allocations and services for youth and children in emergency family shelters (i.e., family units in homeless shelters, temporary and satellite shelters such as hotels, and shelters for victims of family violence).

CMHC Project Officer : *Gloria Neufeld Redekop* *CIDN : 2085 0200*

Division : *Research Division* *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

WOMEN ON THE ROUGH EDGE: A DECADE OF CHANGE FOR LONG-TERM HOMELESS WOMEN

There have been significant changes over the past decade in the profile of women's homelessness and the service context. The proportion of women who use the emergency shelter system in Toronto increased from 24 to 37 percent from 1988 to 1996. As more women become homeless and the existing social service and health system is less able to assist them, the most vulnerable stay homeless for longer periods.

This report constitutes a retrospective review of the changing patterns of women's homelessness in the Toronto area from 1987 to 1997, with a focus on conditions and services for long-term homeless women, based on the observations and expertise of those who have worked closely with homeless women over the previous decade. Interview data from a small number of homeless women are included, along with a research-based profile of long-term homelessness among women in Toronto.

The report discusses distinctions in shelter and other service use patterns among homeless women (i.e., transitional, episodic, and chronic homelessness) and implications for housing and support service requirements. Women who are homeless for long periods of time face similar circumstances as other homeless women except that their personal resources are fewer, their state of physical and mental health poorer, and their individual capacity to cope is weaker. They are very likely to have severe mental health problems, and it appears that the prevalence of addictions is increasing.

Prepared by Sylvia Novac, Joyce Brown, Gloria Gallant. CMHC Project Officer: Brenda Baxter. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

HOUSE CONSTRUCTION INDUSTRY

HOUSING CONSTRUCTION INDUSTRY: CHALLENGES AND OPPORTUNITIES FOR THE 21st CENTURY

The objective of this study is to examine the evolution of the housing industry in Canada since the mid-1980s, the industry's current and expected future challenges in the period to 2010, and the ways it might and should adapt.

CMHC Project Officer : *Ian Melzer*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1987 0200001
STATUS : Ongoing Project

HOUSING

EXAMINE THE FEASIBILITY OF STUDYING THE CORRELATION BETWEEN ADEQUATE HOUSING AND HEALTH AND EDUCATION

This research proposal will examine the feasibility of studying the correlation between adequate housing and health and education.

CMHC Project Officer : *Line Gullison*
Division : *Strategic Planning*
Policy & Marketing
AVAILABILITY : *Publication is not available*

CIDN : 2193 1500001
STATUS : Ongoing Project

FUTURE OF THE INTERNET AND THE HOUSING SECTOR

This study examines the extent of the usage of the Internet in the housing sector. It also briefly explains the Internet and its main features, the history of its general usage, growth worldwide and the opportunities it provides for the housing sector over the next few years. Trends associated with Internet usage are discussed for the following areas of the housing sector: housing construction; the real estate sector, housing financing and evaluation; governments and government agencies; industry associations and urban planning in general. The study provides a useful listing of housing-related Web sites in Canada and the United States in such areas as: institutional and government agencies; construction and architecture; real estate; financing and mortgage loans; planning and related specialties and co-operative housing.

Prepared by Syllable Internet Expressions Inc. Reviewed and supplemented by Florence Millerand. Prepared for Canada Mortgage and Housing Corporation. Ottawa: CMHC, 1999. (Housing Affordability and Finance Series: Research Report)

Order number: PE0317 **Price: $12.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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Toronto, Ontario
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1-800-668-2642
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HOUSING AND POPULATION HEALTH

This study looks at the links between housing and population health. Population health is a way of conceptualizing and acting on health, by focusing on why some groups in society are more prone to illness than other groups. This study will look at the extent to which housing is or may be a factor. The study will commence with a comprehensive and critical review of the literature. This will be followed by an assessment of the evidence to date and the potential for evidence in the future, with an emphasis on the methodological and measurement issues. The project will conclude with a set of ideas for future research directions.

CMHC Project Officer : *Philip Deacon*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1926 0200001
STATUS : Ongoing Project

HOUSING, SOCIAL INEQUALITY AND POPULATION HEALTH

This study is a cross-sectional, survey-based investigation of relationships between housing, social inequality and population health in 13 Vancouver neighbourhood areas. Based on a model of the 'social determinants of health', the research examines relationships between differences in housing suitability, affordability, tenure, type, satisfaction, meaning, and neighbourhood social character on the one hand, and individual health status on the other, while controlling for age, gender, income, and ethnicity differences.

The major objectives are: to investigate ways in which social relations concerning housing and home contribute to the social production of health for individuals and to investigate ways in which housing (esp. affordability) and people's homes could act as a nexus for the production and reproduction of unequal social relations and social inequalities in health status.

CMHC Project Officer : *Philip Deacon* — *CIDN : 2144 0200008*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

AFFORDABLE HOUSING SOLUTIONS - FIFTEEN SUCCESSFUL PROJECTS

The project documents innovative approaches and "best practices" for creating affordable housing from the Canadian non-profit and municipal housing sectors. Fifteen case studies highlight several innovative approaches to producing affordable housing including life leases, redevelopment, equity cooperative, co-housing, fundraising and development fund. The case studies describe in detail the attributes of each project and the process that enabled their realization. It is a valuable source of information for affordable housing providers.

CMHC Project Officer : *Fanis Grammenos* — *CIDN : 1794 0200002*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

AFFORDABLE, VERSATILE HOUSING

This project identifies and describes house designs that enable a house to accommodate a range of household types, sizes and needs by means of its adaptability. The report documents the features of designs that have been incorporated into built projects and explains their economic and use advantages. The set of designs included covers all housing forms, from single detached houses to multiple-family apartment dwellings. This is the first guide on adaptable designs that lists and classifies the means by which houses can become adaptable.

CMHC Project Officer : *Fanis Grammenos* *CIDN : 1783 0300001*

Division : *Research Division* *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

ALTERNATE TENURE ARRANGEMENTS

The project has two broad objectives: (1) to develop an up-to-date consolidated source of information on the range of alternate tenure arrangements that can be used to implement affordable housing through partnerships; and (2) to assess the extent to which projects utilizing alternate tenure arrangements have successfully met client needs, preferences and expectations. It is intended to be of interest to municipal and provincial officials, and not-for-profit and community groups. Work on the project will include a review of the types of alternate tenure arrangements that exist in Canada, as well as a more focused examination of specific Canadian alternate tenure arrangement projects.

CMHC Project Officer : *David Scheriowski*

Division : *Research Division* *STATUS : Planned*

AVAILABILITY : *Publication is not available*

BACKGROUND RESEARCH ON PHILANTHROPIC SUPPORT FOR AFFORDABLE HOUSING

The recent Part IX research project entitled "The Role of Public-Private Partnerships (PPPs) in Producing Affordable Housing: Assessment of the U.S. Experience and Lessons for Canada" noted that philanthropies" were a critical participant in the development of the PPP affordable housing system in the U.S. This research project will address the considerable information gap with respect to the role that philanthropic support has played and could potentially play in the provision of affordable housing in Canada. The project will provide organizations involved in either creating or supporting the creation of affordable housing through PPPs with an understanding of the opportunities, as well as alternative ways and means of obtaining financial support from the gamut of potential donor sources in the philanthropic sector. The research is being managed under the direction of an advisory committee that includes members from the Canadian Housing Renewal Association's Board, the CCPPPH National Advisory Committee, a former Director of the Canadian Centre for Philanthropy, CMHC national office and field staff from the CCPPPH as well as Research Division.

CMHC Project Officer : *David Metzak*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2073 200001
STATUS : Ongoing Project

BLENDED INCOME HOUSING: LITERATURE REVIEW AND ANALYSIS

The purpose of this project is to provide a summary of the range of housing, social and economic issues and thinking on income blended housing projects. It is a jointly funded CMHC-Revenue Canada initiative with members of both agencies serving as advisory committee members. The final report will be of interest to third sector housing providers and homebuilders as well as municipal and provincial housing officials. The first phase of the project will focus on the development of an analytical framework which will be used in the review of literature on blended income housing. Literature from Canada, the United States, Great Britain and other western industrialized countries will be reviewed in the secondary phase. Findings from the second phase will be analysed so that a comprehensive picture of the range of issues on income blending in housing projects can be presented.

CMHC Project Officer : *David Scherlowski*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1925 0200001
STATUS : Ongoing Project

COMPENDIUM OF HOUSING AFFORDABILITY STRATEGIES

This project will assemble an electronic database of strategies that have been successfully used to improve housing affordability. These strategies will appear under categories of activity such as: Policy and Regulation; Housing and Community Design; Financing and Tenure; Construction and Technology; Operations and Management; and Redevelopment. Each strategy will be explained and illustrated with an example project. The database is expected to be accessible through the CMHC web site and be fully searchable and linked to relevant sources of information of the strategies.

CMHC Project Officer : *Fanis Grammenos*

Division : *Research Division*

AVAILABILITY : *Publication is not available*

CIDN : 2053 0200004

STATUS : Ongoing Project

GUIDE TO AFFORDABLE HOUSING PARTNERSHIPS

Today, partnerships have become more and more common in both the private and public sectors as a way of stretching limited resources and achieving strategic objectives. To help you work with other individuals and organizations to address housing needs in your community, Canada Mortgage and Housing Corporation has developed this guide. This guide is intended for individuals and organizations in the non-profit, public and private sectors who have an interest in providing affordable housing for families, single persons, seniors and people with disabilities.

A partnership in housing is an arrangement between two or more parties who agree to work together to achieve shared or complementary housing objectives. Partnerships in housing can be applied at different stages in the life cycle of housing creation - asset creation, maintenance or renewal. They may also be formed to solve housing problems and issues through program and policy development. Partnerships vary in their duration and in their level of formality. Partnerships in housing, except under federal and provincial housing programs, are a relatively new way of delivering housing in Canada. Nevertheless, an impressive number of initiatives have been undertaken or are currently underway. Examples of partnership approaches are given throughout the guide to help you gain a better understanding of the partnership process and how it can be applied to the provision of affordable housing.

Prepared by the consulting team of Linda Lapointe of Lapointe Consulting Inc., Lauren Millier and Greg Spafford of PricewaterhouseCoopers and Luba Serge. Ottawa: Canada Mortgage and Housing Corporation, 1999, c1998.

Order number: NE2216 **Price: $19.95 + GST and handling charges.

STATUS : Completed Report

AVAILABILITY : *CMHC Information Products*
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Stn BRM B
Toronto, Ontario M7Y 6E5
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International clients see page 9 for order instructions

MARKET ANALYSIS AFFORDABILITY SOFTWARE PROJECT

The objective of this project is to make modifications to Affordability to keep the software current with the latest technology; provide customization for interested clients/partners; create a fully functional Internet version should it be feasible; and provide technical support and expertise to help solve issues and problems that connot be resolved by CMHC's help desk.

CMHC Project Officer : *Greg Goy*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1536 1000002
STATUS : Ongoing Project

MUNICIPAL REGULATION, LAND USE PLANNING AND FINANCIAL MEASURES TO ENCOURAGE NEW AFFORDABLE HOUSING PRODUCTION

The objective of this project is to raise awareness the range of alternative regulatory (i.e. inclusionary zoning, density bonusing, alternative development standards), land use planning (i.e. performance based planning) and financial measures (i.e. exaction programs) which can be used by municipalities during the development approval process in order to implement new affordable housing. The research is to identify and describe the range of alternative regulatory, land use planning and financial measures that can be used by municipalities to create new affordable housing. The project is aimed at addressing the information needs of planners, homebuilders, land developers, third sector affordable housing providers as well as municipal finance officials.

CMHC Project Officer : *David Scherlowski*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2080 0200001
STATUS : Ongoing Project

MUNICIPAL REGULATORY INITIATIVES: PROVIDING FOR AFFORDABLE HOUSING

This report examines three types of regulatory initiatives used by municipalities to provide for affordable housing. These consist of inclusionary zoning, a variety of exaction programs including linkage fees, and density bonusing -- also known as incentive zoning in many places.

All these initiatives rely on the development approval process to encourage, enable or require for-profit developers in some way to provide for housing affordable specifically to lower-income households. While only used to a limited extent in Canada, they have been increasingly used across the United States since cutbacks to federal funding in the early 1980s.

This report is intended to make the opportunities offered by these initiatives more widely known to local housing officials and others involved in the development of affordable housing in Canada.

The recent experience with these initiatives in both countries is reviewed, drawing upon both published and municipal reports as well as extensive telephone interviews. The findings are presented mainly through an overview of the three types of initiatives and profiles of two dozen of the most important of representative examples.

Prepared by Richard Drdla Associates Inc. Prepared for Research Division, Canada Mortgage and Housing Corporation. CMHC Project officer: David Scherlowski. Ottawa: CMHC, 1999. (Housing Affordability and Finance Series Research Report)

Order number: PE0326 **Price: $12.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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NATURE, APPLICABILITY AND POTENTIAL OF HOUSING TRUST FUNDS IN CANADA

The objective of this project is to examine the nature and applicability of housing trust funds and the potential to establish them in Canada for the purpose of funding affordable housing development. The beneficiaries of this work will be municipal and provincial policy analysts, and finance officers, as well as non-profit and social housing providers

CMHC Project Officer : *David Scherlowski*

Division : *Research Division*

AVAILABILITY : *Publication is not available*

CIDN : 2071 0200001

STATUS : Ongoing Project

RESEARCH ON AN IMPROVED MEASURE OF AFFORDABILITY FOR ESTIMATING HOUSING NEED IN CANADA

This study was undertaken to assist the Federal/Provincial/Territorial Partners in their review of the standard for housing affordability used in estimating Core Housing Need. Specifically, the report examines whether there is an alternative measure that better approximates housing affordability needs across the country than the current fixed 30-percent Shelter Cost-to-Income Ratio (STIR).

The study was comprised of three major components:

- Examining the fixed 20-percent STIR norm in relation to actual shelter spending patterns;
- Exploring alternative variable-STIR measures which aim to treat households with differing circumstances more equitably than is the case under a fixed STIR; and
- Estimating the number of households in need under the alternative approaches.

Prepared by Clayton Research Associates Limited in association with Fuller Information. Prepared for John Engeland, Research Division, Canada Mortgage and Housing Corporation. Ottawa: CMHC, 1997.

(Housing Affordability and Finance Series: Research Report)

*Order No. PE0311 ** Price $12.95 + GST and handling charges.*

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information products*
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ROLE OF PUBLIC-PRIVATE PARTNERSHIPS IN PRODUCING AFFORDABLE HOUSING: ASSESSMENT OF THE U.S. EXPERIENCE AND LESSONS FOR CANADA

This report examines how public-private partnerships (PPPs) have emerged in the United States as a delivery vehicle for the provision of affordable housing.

The report first reviews the historical factors and circumstances that bred the PPP system. This evolutionary period is contrasted with the conditions that prevailed in Canada. Part 1 briefly reviews and presents a conceptual framework to describe the range of mechanisms and measures that are used to patch together affordable housing.

Part 2 then introduces and reviews a set of illustrative case studies that were used to examine, in greater detail, how affordable housing projects and partnerships are structured and packaged in the United States. The key features of affordable housing projects and PPPs are highlighted.

Part 3 provides a brief overview of the Canadian context and reviews a smaller set of Canadian case studies. The experience in each country is juxtaposed as a way to help understand the differences that exist and the potential of some of the U.S. approaches to be adapted to fill voids in the Canadian system.

An overall assessment of the U.S. experience and the opportunities to expand the production of affordable housing in Canada through PPPs are the subject of Part 4.

Three detailed appendixes contain, respectively, greater detail on the mechanisms, measures and roles of key partners (Appendix A); profiles of the 15 U.S. case studies (Appendix B); and profiles of the seven Canadian case studies (Appendix C).

Prepared by Steve Pomeroy, Focus Consulting and Greg Lampert, Economic Consultant, in association with James Wallace, Abt Associates, and Robert Sheehan, Regis J. Sheehan and Associates. Prepared for Research Division, Canada Mortgage and Housing Corporation. CMHC Project Manager: David Metzak. Ottawa: CMHC, 1998. (Housing Affordability and Finance Series Research Report)

Order number: PE0318 ** Price $12.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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ETHNICITY AND CULTURE IN TENANT PARTICIPATION

This case study looks at possible barriers to community participation that are specifically related to cultural and ethno-racial diversity and suggests strategies that have the potential to enhance participation. The setting for the study is a government assisted housing project in Toronto where the residents include a large number of immigrant families from many different cultural backgrounds.

The study showed that the main barriers to participation were a lack of knowledge about rights in the community, a perception that meetings were not effective and that nothing would be done about issues, and feelings of isolation and lack of confidence. However, these issues were not specific to any particular group and were not directly related to diversity. A few minor barriers which did have their origins in diversity were also noted.

The study concluded that, by and large, the main barriers were a matter of perception resulting from different expectations of the various cultural groups, management, staff and youth. There were also many straightforward actions that could be taken that would help close the gaps in expectations, and that these could be combined into five strategic approaches centred on: meetings, information dissemination, relationship building, involvement of cultural groups, and involvement of youth.

CMHC Project Officer : *Philip Deacon*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

METROPOLIS CENTRES OF EXCELLENCE FOR RESEARCH ON IMMIGRATION ISSUES

CMHC and other federal departments provide ongoing financial support to stimulate and support policy-relevant research on immigration issues, through a network of research centres in Canadian universities. Information on Metropolis and on the almost 200 funded research projects can be found at <canada.metropolis.net>.

CMHC Project Officer : *Tom Kerwin* *CIDN : 2224 0200001*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

HOUSING AND IMMIGRATION

NEWCOMERS' GUIDE TO CANADIAN HOUSING

This guide is designed to answer newcomers' questions about renting or buying a house. It provides information about housing in Canada, sets out the nature and types of questions to ask landlords, building superintendents, real estate sales representatives, property managers and lenders and explains mortgages, interest, and the steps in buying a house.

CMHC Project Officer : *Steve Mennill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1802 0200001
STATUS : Ongoing Project

HOUSING AND TAXATION

LITERATURE REVIEW: TAX INCIDENCE IN THE CANADIAN HOUSING SECTOR

This project has three objectives: (1) to survey current thinking about tax incidence in the housing sector; (2) to determine what this might imply with regard to tax incidence in the Canadian housing sector; and (3) to identify what (if any) additional research would help us better understand the distribution of tax burden in Canadian housing. To achieve these objectives the contractor will summarize major theoretical approaches to tax incidence in housing, delineate a basic theoretical model of tax incidence, summarize relevant empirical literature and determine what can be reliably said about the incidence of taxes currently imposed on Canada's housing sector.

CMHC Project Officer : *Orlando Manti*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1980 0200001
STATUS : Ongoing Project

ADAPTING CANADIAN HOUSING TECHNOLOGY TO INTERNATIONAL MARKETS: DESIGN, MATERIALS, COMPONENTS AND STRUCTURES

Canada has one of the most diverse and successful housing industries in the world. Operating from this solid base, hundreds of companies with housing-related products, technologies and systems to offer are operating in foreign markets. Many are looking actively for additional export and investment opportunities abroad. To succeed, they pay attention to differences from Canadian norms in national and local standards, cultural traditions, design and quality expectations.

This report answers three main questions: do buyers in foreign housing markets accept what Canadian firms have "off the shelf" at present?; how are Canadian exporters already adapting to specific requirements of foreign customers?; and what future opportunities exist to increase market share by adapting housing-related products, technologies and services?

Based on Statistics Canada export data, many Canadian housing-related materials and products already enjoy widespread acceptance in many foreign markets. Exporters assure buyers of the quality of goods through a variety of means, and also compete effectively on price, availability, and timeliness of delivery. Nevertheless, significant opportunities remain to expand market share through adaptation to local taste, conditions and standards.

Experienced housing exporters are already strongly committed to and acting on the idea of adapting what they sell in foreign markets. They alter design, colour, finishing, quality, performance, dimensions, language of literature or other features, in some cases substantially. However, more needs to be done to facilitate exchanges of practical information on this topic among current and prospective exporters, resulting in significant gains in Canadian export success. Against Canada's very able competitors in international housing markets, every marketing tool that can be created for Canadian firms is needed. Advantages to be gained over other Canadian firms by clutching best practices in many foreign markets are fleeting, if they exist at all. While there are obviously some proprietary technologies and products and commercial-confidential "tricks of the trade", most product and service adaptations are readily evident from published company literature. The potential market is often so vast that there is plenty of room for everyone from Canada, despite possible perceptions to the contrary.

Foreign private sector partners and government research institutes are increasingly likely to become partners in "co-evolving" a version of Canadian housing technology to meet their own circumstances and needs in future. However, this approach to adaptation must be approached with care, so as to avoid difficulties caused in Japan, for example, where Canada is more noted as a source of quality, competitively-priced lumber, than as a supplier of quality whole-house systems.

Certain Canadian companies focus on products, technologies and services specifically suited to international markets alone, mainly for "low cost" housing. With a few exceptions, the latter appear to be having only modest success at present. The most productive avenue for the future may lie in the direction of investing in local ventures and technology transfer rather than exports as such.

The report concludes with handy lists of key questions for potential use by Canadian companies exploring entry into new international markets or seeking to increase market share. These take the user through an issue-by-issue or element-by-element review of potential adaptation requirements and considerations.

The report also contains contract information for experts in the field, and references for additional reading.

Prepared by C. David Crenna, The Bayswater Consulting Group Inc. CMHC Project Officer: Rob Duncan. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

***STATUS** : Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

BUSINESS GUIDE TO GERMANY FOR THE CANADIAN HOUSING INDUSTRY

The objective of this project is to complete a detailed and accurate guide to Germany for the Canadian housing industry.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1953 0900006
STATUS : Ongoing Project

CANADA'S HOUSING EXPORTERS AND PROSPECTIVE EXPORTERS IN ONTARIO

The purpose of this project is to conduct a study to identify and profile Canada's housing exporters and prospective exporters in Ontario.

CMHC Project Officer : *Leslie Barrett-Sanderson*
Division : *Canadian Housing Export Centre*
Ontario Business Centre
AVAILABILITY : *Publication is not available*

CIDN : 2153 0900001
STATUS : Ongoing Project

CANADIAN/JAPANESE CONSTRUCTION COST ANALYSIS OF A TYPICAL 2X4 FRAMED HOUSE PLAN

The purpose of this project is to develop a costing spreadsheet tool for use on all soft and hard costs forming part of the delivered turn key project including at minimum, design; permits and approvals; materials and labour etc.

CMHC Project Officer : *Jay Thakar* — *CIDN : 1596 0900001*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

CHINA HOUSING NEEDS SURVEY

The purpose of this project is to conduct the "China Housing Needs Survey" to determine the current and future housing needs of Canadian companies present in China, and to determine Canadian companies interested in locating staff in Canadian supplied housing.

CMHC Project Officer : *Murray Rasmusson*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

CODES AND STANDARDS PROPOSAL TO GERMANY

This project's objective is to develop and implement a strategy and action plan for a proposal to be made to German authorities to improve access to the German housing market for the Canadian housing system.

CMHC Project Officer : *Louis Musto* — *CIDN : 1809 0900001*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

CONTRIBUTION TO A STUDY ON PACIFIC RIM MARKETS FOR TERMITE-RESISTANT WOOD PRODUCTS

The objective of this project is to study the Pacific Rim markets for termite-resistant wood products.

CMHC Project Officer : *Jay Thakar* — *CIDN : 2104 0900001*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

CRITERIA TO HELP FORGE SUCCESSFUL CANADIAN HOUSING ALLIANCES

The purpose of this project is to develop and validate criteria to help determine what makes alliances successful in the housing export market.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1770 0900001
STATUS : Ongoing Project

DEVELOPMENT OF A FRAMEWORK FOR CODES, STANDARDS AND CERTIFICATION FOR THE USE OF CANADIAN HOUSING TECHNOLOGY AND PRODUCTS IN RUSSIA

The purpose of this project is to provide a standard base for family house building development, including row houses, in the cities of the Russian Federation in accordance with the main directions of the 'Zhilische' housing program.

CMHC Project Officer : *Anjela Pavlova*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 2145 0900001
STATUS : Ongoing Project

ESTABLISHING POLAND REAL ESTATE FUND

The purpose of this project is to assess the feasibility of establishing a Poland Real Estate Fund.

CMHC Project Officer : *Mietka Zieba*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 2205 0900001
STATUS : Ongoing Project

EVALUATION OF CODES, REGULATIONS, DESIGN & BUILDING METHODS IN PRIORITY MARKETS (USA, RUSSIA, SOUTH KOREA, CHILE)

Canadian exporters of pre-packaged housing and components can compete in off shore markets if they can understand and access their market. Exporters must negotiate foreign markets, regulatory systems and familiarize themselves with local design practices and construction technologies, interpret the local vernacular and housing preferences and then market and distribute their product. The firs t step in managing these obstacles is to fully understand them so that strategies can be developed to overcome them. Some of this information has already been researched or is in the process of being researched by CMHC and other agencies such as DFAIT, NRCan and NRC. In other cases, especially in emerging markets, little information is available to guide exporters.

CMHC Project Officer : *Rob Duncan*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1949 0200002 (USA)
STATUS : Ongoing Project

EXPORT HOME SEISMIC SLAB FOUNDATION

The purpose of this project is to identify and develop a new seismic resistive foundation system for use in Japan, which could be "packaged" with Canada's housing technology and exports to create a value-added and thus more attractive export housing product.

CMHC Project Officer : *Rob Duncan*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2019 0200001
STATUS : Ongoing Project

EXPORT PERFORMANCE AND NEEDS OF THE CANADIAN MANUFACTURED HOUSING INDUSTRY

The objective of this research is to develop a statistical profile and to identify the export performance and needs of the Canadian manufactured housing industry.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1909 0900001
STATUS : Ongoing Project

FEASIBILITY STUDY ON AFTER-SALES SERVICES AND ESTABLISHMENT OF A WAREHOUSE FOR CANADIAN HOUSING EXPORTS IN JAPAN

The objectives of this project are to identify existing programs for after-sales services; to provide options for after-sales services; to study Japanese laws and regulations governing the establishment of a warehousing facility in Japan by a foreign company; and to do a cost-benefit analysis for the recommended option.

CMHC Project Officer : *Jay Thakar*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 2056 0900001
STATUS : Ongoing Project

FEASIBILITY STUDY TO BUILD A DEMONSTRATION HOUSE IN THE UNITED KINGDOM

This project's objective is to determine the potential market for Canadian woodframe housing and the feasibility of building a demonstration house in the United Kingdom.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 2099 0900001
STATUS : Ongoing Project

GENERAL ASSESSMENT OF HOUSING FINANCE SYSTEMS AND OPPORTUNITIES IN THE MIDDLE EAST

This project's objective is to do a general assessment of housing finance systems and opportunities in the Middle East, and prepare a strategic business development strategy that will enable CMHC to create a network and market its products and services in the Middle East.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 2165 0900001
STATUS : Ongoing Project

HOUSING MARKET IN THE UKRAINE AND MARKETABILITY OF WESTERN CANADIAN CONSTRUCTION PRODUCTS IN THE UKRAINE

The purpose of this project is to assess the housing market in the Ukraine and to research the marketability of western Canadian construction products in the Ukraine.

CMHC Project Officer : *Mietka Zieba* | *CIDN : 2179 0900001*

Division : *Canadian Housing Export Centre* | *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

HOUSING MARKET INTELLIGENCE STUDY OF JAPAN

Japan is one of the world's largest housing markets - housing starts averaged 1.5 million dwelling units annually during 1994-1997 period. This level of annual Japanese housing starts exceeds that of the United States over the same period (1.4 million) and dwarfs the 134,000 average annual starts in Canada.

Much of the market for housing products and services in Japan relates to the construction of single-family housing, which comprises roughly half of the country's total annual housing starts. Many countries including Canada are aggressively targeting Japan as a market for housing-related exports.

Access to market information and research expertise represents an important barrier to Canadian housing firms that are seeking to explore export opportunities in Japan.

This report comprises Phase 1 of a two-phase attempt to assist in this regard. Commissioned by the Canadian Housing Export Centre (CHEC) within Canada Mortgage and Housing Corporation (CMHC), the report highlights the availability, sources and quality of housing market information in Japan. The intent is to inform the Canadian housing industry about how to access important information on the Japanese market.

The Phase 2 study will provide an analysis of prospects for Canadian exports and an analysis of the penetration of imports into this market.

Ottawa: Canadian Housing Export Centre, Canada Mortgage and Housing Corporation, 1999.

STATUS : *Completed Report*

AVAILABILITY : *Available in PDF file on CMHC's Web site. To download this 47 page document visit CMHC's Web site at www.cmhc-schl.gc.ca, click on the Export Opportunities section and browse through the library.*

INDIA MARKET STUDY

The objective of this project is to study the market for Canadian housing industry in India, i.e. manufacturers of products related to housing, prefabricated housing, on-site builders and renovators, and professional services.

CMHC Project Officer : *Jay Thakar*

Division : *Canadian Housing Export Centre*

AVAILABILITY : *Publication is not available*

CIDN : 2049 0900001

STATUS : Ongoing Project

INTERNATIONALISATION DE LA FILIÈRE HABITATION: UNE ANALYSE PERCEPTUELLE

In the rush of the global trade, an increasing number of Canadians firms are looking to foreign markets, and the housing industry is no exception. As domestic demand is down over previous years, prospecting new markets outside the country, is an avenue firms are increasingly less hesitant to explore. To date, however, the housing industry does not have its rightful share of exports, given its size in the Canadian economy.

This study is primarily a qualitative study based on about forty extensive interviews of corporate executives operating in three sub-sectors of the housing industry: professional construction services (builders, engineers, architects, etc.), manufacturers of building products and manufacturers of pre-fab homes. The interviews were conducted with firms from all corners of Canada. The purpose was not so much to identify the objective export-related difficulties as it was to see how corporate executives perceived these difficulties.

The study's conclusions are the following:

1. Firms generally tend to underestimate the difficulties, constraints and barriers related to international commerce.

2. For business, one of the main challenges in international business is delivering the product and the service within the required timeframes.

3. Corporate executives do not fear market globalization.

4. Few firms are concerned with diversifying their markets.

5. Businesses in the housing sector are not very familiar with the competition in target markets abroad.

6. Building systems which use wood have a harder time penetrating foreign markets.

7. Firms are reserved with respect to government assistance.

Prepared by François Cadotte. CMHC Project Officer: Joanne Hallé. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

INVESTIGATION OF CO-VENTURES AND EXPORT POTENTIAL FOR BUILDING PRODUCTS AND MATERIALS RELATED TO SUSTAINABLE DEVELOPMENT IN CHINA

The purpose of this project is to explore the opportunities that exist in China for co-ventures and the export of Canadian products, technology and materials related to sustainable development to lower the impact on the natural environment and/or promoting a healthy indoor environment.

CMHC Project Officer : *Jay Thakar*
Division : *Canadian Housing Export Centre* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

RESEARCH ON HOUSING EXPORT OPPORTUNITIES IN FRENCH-SPEAKING COUNTRIES AT THE 1999 FRANCOPHONE SUMMIT

The purpose of this project is to undertake and conduct research to determine housing export opportunities in French-speaking countries and at the 1999 Francophone Summit.

CMHC Project Officer : *Louis Musto* *CIDN : 2171 0900001*
Division : *Canadian Housing Export Centre* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

RETROFITTING RUSSIA'S HOUSING STOCK: OPPORTUNITIES AND OBSTACLES FOR CANADIAN EXPORTERS

The purpose of this project is to identify several basic business development strategies which could be employed by Canadian firms to practically and realistically respond to the market opportunities represented by the Russian housing sector.

CMHC Project Officer : *Oliver Drerup* *CIDN : 1830 0200001*
Division : *External Research Program* *STATUS : Ongoing Project*
Research Division
AVAILABILITY : *Publication is not available*

SEMINAR CURRICULUM ON THE CANADIAN HOUSING SYSTEM AND THE ESTABLISHMENT OF AN INTERNATIONAL TRAINING TEAM

The objective of this project is to develop a seminar curriculum on the Canadian housing system to establish an international training team.

CMHC Project Officer : *Louis Musto*
Division : *Canadian Housing Export Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1973 0900001
STATUS : Ongoing Project

STUDY OF FACTORY-BUILT HOUSING MARKET OPPORTUNITIES IN SOUTHEASTERN U.S.A..

The purpose of the first of this two-part study was to investigate the potential niche markets open to Canadian manufacturers of factory-built housing in the Southeastern United States. Produced in late 1998, the report provides a substantive examination of the housing markets in Alabama, Georgia, Mississippi, North and South Carolina, and Tennessee. The author of the report states that these specific housing markets were targeted because this particular geographic area is experiencing strong economic growth and that this market is currently a fragmented residential construction market.

Data were collected through research tools such as telephone and personal interviews, analysis of previous research and demographic information on the primary geographic market.

The research reveals there is a growing market for wall panels, as well as timber frame and log homes. A number of US builders interviewed for this project expressed an interest in developing a working relationship with Canadian manufactured housing firms.

Ottawa: *Canadian Housing Export Centre, Canada Mortgage and Housing Corporation, 1999.*

STATUS : *Completed Report*

AVAILABILITY : *Available in PDF file on CMHC's Web site. To download this 58 page document visit CMHC's Web site at www.cmhc-schl.gc.ca, click on the Export Opportunities section and browse through the library.*

STUDY OF THE MIDWEST BUILDING PRODUCTS MARKET IN THE REGIONS OF ILLINOIS, WISCONSIN AND MISSOURI

The purpose of this project is to undertake a study to provide Canadian companies with a general overview of the market forces within the building products sector in the three state regions of Illinois, Wisconsin, and Missouri.

CMHC Project Officer : *Louis Musto* — *CIDN : 2172 0900001*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

STUDY TO IDENTIFY AND PROFILE CANADA'S HOUSING EXPORTERS AND PROSPECTIVE EXPORTERS IN ATLANTIC CANADA

The purpose of this project is to develop a database of Atlantic Canadian firms in the housing sector involved in or interested in exporting opportunities and to collect descriptive information on the firms identified.

CMHC Project Officer : *Charles MacArthur* — *CIDN : 2152 0900001*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

SURVEY OF CANADIAN HOUSING-RELATED EXPORTERS AND POTENTIAL EXPORTERS

The purpose of this project is to carry out a quantitative study among companies that are either current or potential housing-related exporters.

CMHC Project Officer : *Louis Musto* — *CIDN : 2175 0900001*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

SUSTAINABLE DEVELOPMENT IN CANADA

The objective of this project is to investigate the application of Canadian sustainable development in the Japanese market.

CMHC Project Officer : *Jay Thakar* — *CIDN : 2092 0900001*
Division : *Canadian Housing Export Centre* — *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

DEMAND PROFILES FOR HIGHER-DENSITY HOUSING

This study examines the relationship between building types as defined by the relative density of projects and household characteristics. It uses the 1991 Census Public Use Micro Data Files (PUMF) to identify the characteristics that distinguish the demand for four types of dwellings:

- the single-family house;
- the duplex, row, semi-attached and attached options that will be referred to as the duplex and townhouse option;
- the under five-storey apartment building; and
- the highrise apartment.

It considers households as formed by couples with children, couples without children, lone parents, and people living alone or with other unrelated people.

The aim is to develop profiles describing the characteristics of households generating the demand for units in higher-density building types and to identify target populations whose entry into the medium-density housing options would contribute most to the goal of making our cities more compact while maintaining a reasonable level of risk in the marketing of units.

The study starts by examining the 1991 census data to describe the households and housing options of Ottawa residents. It links the propensity of the different household types to occupy each of the four buildings types with the Canada Mortgage and Housing Corporation (CMHC) long-run projections of households for the Ottawa region. These projections form a basis for the discussion of how changes in income and housing prices may affect future demand. The role of the existing stock is discussed and a base-line projection developed for the proportion of future housing starts that will be in higher-density buildings. The study concludes by describing household profiles that can serve as targets for the development of new higher-density housing options.

Prepared by Andrejs Skaburskis. Prepared for Research Division, Canada Mortgage and Housing Corporation. CMHC Project Officer: Fanis Grammenos. Ottawa: CMHC, 1999. (Housing Affordability and Finance Series)

Order number: PE0341 **Price: $12.95 + GST and handling charges.

STATUS : Completed Report

AVAILABILITY : *CMHC Information Products*
P.O. Box 35005
Stn BRM B
Toronto, Ontario M7Y 6E5
1-800-668-2642
Fax orders from Canada: 1-800-245-9274
International clients see page 9 for order instructions

EMPLOYMENT AND HOUSING ACTIVITY: A CYCLICAL ANALYSIS

The objective of this project is to review the economic literature, prepare an estimation strategy, analyze the past cycles of retained employment indicators and estimate the elasticities of housing starts and MLS sales in relation to the employment indicators.

CMHC Project Officer : *Louis Trottier*
Division : *Market Analysis Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1952 1000002
STATUS : Ongoing Project

HOME PRICES: LONG-TERM DETERMINANTS AND PROSPECTS

The objective of this project is to examine the following types of questions related to the long-term determinants and prospects for home prices: (1) What does current expert opinion say about long-term price trends in Canada? (2) What does the historical experience of Canadian and other housing markets suggest about future price trends? (3) According to current econometric literature, what factors principally govern long-term movements in home prices? (4) How are these determinants expected to evolve over the next twenty-five years? (5) Is there reason to believe that home prices will fall over the next twenty-five years? (6) How credible is this view in comparison to other scenarios? (7) What are the main weaknesses in our current understanding of long-term price movements?

CMHC Project Officer : *Ian Melzer*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1961 0200001
STATUS : Ongoing Project

HOUSING MARKETS IN BC'S RESOURCE TOWNS: CASE STUDIES FROM THE 1980'S TO THE 1990'S

The purpose of this project is to undertake a detailed study of the housing markets in the following resource towns: Prince George, Prince Rupert, Port Alberni, Trail, Fort St. John and Kelowna, over the period 1976 - 1996, in an effort to model the leads and lags in the local resource economies.

CMHC Project Officer : *Joel Starkes*
Division : *Market Analysis Centre*
AVAILABILITY : *Publication is not available*

CIDN : 2072 1000001
STATUS : Ongoing Project

HOUSING MARKET

HOUSING TRANSITION IN SINGLE INDUSTRY 'INSTANT TOWNS'

This research project examines the local housing market in two single industry "instant towns" in Canada with the purpose of tracking transitions within the local housing market as the economic fortunes of the local industry and community changes through time. The research is intended to provide an increased awareness and understanding of these isolated and potentially vulnerable housing markets to public policy makers, resource corporations contemplating such developments, "instant town" communities and their resident households.

CMHC Project Officer : *David Scherlowski* — *CIDN : 2144 0200004*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SEMIOMETERING STUDY

The purpose of the study is to segment the market on the basis of new home buyers and existing home buyers. The segmentation will be done in relation to the values and beliefs of each group.

CMHC Project Officer : *Bruno Duhamel* — *CIDN : 2188 1000001*

Division : *Market Analysis Centre* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

HOUSING SURVEYS

REVIEW OF DATA SOURCES AND INDICATORS

The purpose of this project is to undertake a review of the major national data sources that include housing information which will assist in examining the role each might play in monitoring housing and community trends and developing related indicators.

CMHC Project Officer : *Roger Lewis* — *CIDN : 1988 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

ALTERNATIVE METHODS OF FINANCING MUNICIPAL INFRASTRUCTURE

This study looks at municipal infrastructure finance - the evolution of the issues, the challenges facing municipalities, and different financing methods. The paper evaluates infrastructure financing mechanisms that are alternative or supplementary to government financing. It is intended to serve as a backgrounder for two other studies which examine issues related to provision of municipal infrastructure.

CMHC Project Officer : *David D'Amour*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

PROVISION OF MUNICIPAL INFRASTRUCTURE THROUGH DEMAND MANAGEMENT: GUIDEBOOK AND CASE STUDIES

This study looks at the ability of "demand management" (DM) measures to contribute to meeting future water and wastewater infrastructure demands. DM focuses on why demand peaks occur and how to reduce them. The study describes DM techniques, identifies how to tailor programs to community needs, and introduces tools for planners, engineers, and administrators to reduce water use and wastewater flow by reducing leaks, inflow and infiltration. The guidebook discusses the engineering considerations of water and wastewater conveyance and treatment systems which assist in ensuring that public health and the environment are protected. It provides a balanced perspective of DM considering risks, effectiveness, and costs. Case studies profile DM initiatives in communities in Ontario, Saskatchewan, Alberta and British Columbia.

CMHC Project Officer : *David D'Amour* *CIDN : 1916 0200001*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

PUBLIC-PRIVATE PARTNERSHIPS IN MUNICIPAL INFRASTRUCTURE

This paper is the third in a series of three CMHC studies looking at infrastructure finance. The study looks at the impacts of public-private partnerships on service costs and quality and examines whether privatization reduces costs to existing and new homeowners. It looks at different partnership models, discussed their strengths and weaknesses and presents a number of case studies, shedding light on which are most appropriate under which conditions.

CMHC Project Officer : *David D'Amour* *CIDN : 1788 0200001*
Division : *Research Division* *STATUS : Ongoing Project*
AVAILABILITY : *Publication is not available*

INVESTIGATION INTO THE CAUSES OF RISING MORTGAGE DEBT AND IMPLICATIONS ON THE MORTGAGE MARKET

This study looks at the rising level of mortgage debt in Canada and its implications. The Bank of Canada has noted, with some concern, the rising level of household debt in general and mortgage debt in particular. CMHC has attributed the rise in the latter to mortgages on other than primary residences, and has pointed out that aggregate trends do not take into account the correlation between debts and corresponding assets. By the same token, the National Housing Act (NHA) was changed in 1992 to allow residential mortgages of 95 per cent of the lending value, and first-time owners are allowed to use some of their Registered Retirement Savings Plan (RRSP) funds. These changes should have increased the aggregate demand for mortgage loans. This study extricates the statistical evidence related to growth in mortgage debt and interprets what the trends are indicating.

The study found:

- Despite the rising level of consumer debt, the state of the household balance sheet, on a national accounts basis, is wrong.

- The rising level of consumer debt is principally due to a rising level of mortgage debt, almost exclusively loans by the chartered banks. However, included in the mortgage debt numbers is an unknown quantity, which represents rental properties, cottages, nursing homes, retirement communities and other non-primary residences. A conservative estimate of these portions, taken together, would be approximately one third, in line with the tenure breakdown of the housing stock.

- Despite the use of an estimate of household mortgage indebtedness inflated by mortgages on properties other than principal residences, the mortgage loans outstanding remain well secured by the housing wealth of the country, which continues to rise, albeit at a more modest pace that in previous decades.

- At the household level, using data from the FAMEX from 1982 to 1992, there is no evidence that households have become appreciably more mortgage-indebted over that period. The 1996 survey, when it becomes available, will show the effect of the program-driven, high-ratio mortgages on the overall picture.

- According to industry sources interviewed for this study, credit, is to some extent, supply-enabled, in the sense that the availability of credit and its terms and conditions help shape the debt load assumed by individuals and households.

- There is no evidence of a direct link between high aggregate mortgage debt and the rising level of bankruptcy. Homebuyers who go bankrupt are most likely to be first-time buyers with unresolved debt management issues.

- Finally some portion of the growth in aggregate debt could be expected given the underlying demographics - the baby boom generation has been moving through its peak borrowing years. At this group moves into its saving period, a smaller group will replace it. At the same time, the baby boom generation also stands to inherit a substantial amount of wealth from its prewar parents' generation. The conjuncture of these elements should mean that the high consumer debt will start to decrease.

Prepared by the Corporate Research Group Ltd. in association with Fuller Information and Jacobson Consulting Limited. Ottawa: Canada Mortgage and Housing Corporation, 1999.

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

MANAGING THE RISKS ASSOCIATED WITH A REVERSE EQUITY MORTGAGE (REM) LOAN INSURANCE PORTFOLIO

The purpose of this project is to complete a study on the management of risks associated with an insured reverse equity mortgage (REM) portfolio.

CMHC Project Officer : *Brian Davidson*
Division : *Policy and Marketing*
AVAILABILITY : *Publication is not available*

CIDN : 1728 0100002
STATUS : Ongoing Project

MORTGAGE AND INTEREST RATES MODELING AND FORECASTING

The purpose of this research is to review and evaluate current approaches and practices to modeling and forecasting mortgage and interest rates, and to construct a set of models to provide CMHC with accurate forecasts of these rates.

CMHC Project Officer : *Ali Manouchehri*
Division : *Market Analysis Centre*
AVAILABILITY : *Publication is not available*

CIDN : 1858 100001
STATUS : Ongoing Project

MORTGAGES AND HOUSING FINANCE

PERSONAL FINANCIAL MANAGEMENT FOR HOME OWNERSHIP IN TRANSITIONAL SOCIETIES

The objective of this project is to contribute to the efficiency of the mortgage credit and housing markets of Visegard countries by evaluating the situation which has evolved since 1989 and by making recommendations on what might be done to improve the working of those markets. The project will enable the Canadian housing and financial industries to understand the challenges and opportunities confronting them when dealing with the Visegard markets.

CMHC Project Officer : *Doug Dennis* — *CIDN : 1997 0200001*

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

PERSONS WITH DISABILITIES

ACCESSIBLE DOWNTOWN RESIDENTIAL COMMUNITIES: A CASE STUDY OF WINNIPEG, MANITOBA

The purpose of this project is to examine housing and community design needs of persons with disabilities, including the elderly, to determine how these needs could be met in a downtown residential location as part of the revitalization of a downtown area.

CMHC Project Officer : *Tom Parker* — *CIDN : 2017 0200001*

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

EXAMINATION OF THE HOUSING CHOICES OF PERSONS WITH DISABILITIES

To have accurate information on the housing choices of people aged 15 and over with mobility and agility disabilities.

CMHC Project Officer : *Tom Parker* — *CIDN : 2144 0200019*

Division : *Research Division* — *STATUS : Planned*

AVAILABILITY : *Publication is not available*

EXAMINATION OF THE SUPPORTIVE HOUSING NEEDS OF THE SERIOUSLY MENTALLY ILL IN THE MANITOULIN-SUDBURY DISTRICTS

This External Research study aimed to explore and specify the supportive housing needs, preferences and choices of adults with serious mental illnesses, and in particular to identify similarities and differences among subgroups of this "SMI" population along the lines of geographic location, language/culture, and gender. The study was undertaken in the Manitoulin-Sudbury area of Ontario, where community locales range from urban to rural and remote, and significant proportions of the population are anglophone, francophone and Aboriginal, respectively. One hundred mental health services consumers were interviewed from across the region, plus a cross-section of mental health services providers and representatives of consumer/family support groups. Results indicated that there is a need for supportive housing among all SMI population subgroups regardless of geography, language/culture or gender. The most notable difference among the subgroups was related to geography: consumers living in rural communities outside of the Sudbury district have a higher need for supportive housing because of increased isolation and lack of access to public transportation. Variations by language/culture and gender are also noted in the report although they were not found to be statistically significant in this sample. The report concludes with a series of recommendations to address the identified supportive housing needs.

Prepared by Geneviève Gibbons, David Paquette. CMHC Project Officer: Teresa van den Boogaard. Ottawa: Canada Mortgage and Housing Corporation, 1998. (External Research Program)

STATUS : Completed Report

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa, Ontario
K1A 0P7
Tel.: 613-748-2367 or 1-800-668-2642
Fax.: 613-748-4069
Email: chic@cmhc-schl.gc.ca
International clients see page 9 for order instructions.

HOUSING NEEDS OF PEOPLE WITH DISABILITIES

The objective of this project is to provide a profile of the housing characteristics and needs of people with disabilities using data from the 1991 Census and post-censal Health and Activity Limitations Survey (HALS).

CMHC Project Officer : *David Metzak* — *CIDN : 1045 0200003*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

MAJOR MAINTENANCE AND RESIDENTIAL RENOVATION: A SURVEY OF MEANS TO IMPROVE THE ARCHITECTURAL ACCESSIBILITY OF EXISTING BUILDINGS

The objective of this project is to study the extent to which it is possible to integrate architectural accessibility into existing residential buildings during major maintenance or common renovation work planned by an owner.

CMHC Project Officer : *Sophie Bang, Succursale de Montreal*
CIDN : 2021 0200001

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

SPACE EFFICIENT UNIVERSAL DESIGN INNOVATIONS

The objective of this project is to evaluate design innovations which have been developed specifically to enhance access for people who use wheelchairs.

CMHC Project Officer : *Tom Parker* — *CIDN : 2009 0200001*

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

PROPERTY MANAGEMENT

CURRENT CONDITIONS IN THE RESIDENTIAL PROPERTY MANAGEMENT INDUSTRY

This project is intended to result in a profile of the residential property management industry. It will contain statistical and descriptive information on the size and concentration of the industry, the roles and responsibilities of the key players, and any available data on how the industry is positioned internationally. It is intended to focus on a number of social and economic topics associated with residential property management. Results of the project will determine the nature and depth of associated information gaps and research needs. The project will be of interest to residential property managers.

CMHC Project Officer : *David Scherlowski*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1966 0200001
STATUS : Ongoing Project

RENOVATION AND INSPECTION

HOMEOWNER MOTIVATION AND INNER CITY REVITALIZATION: AN EXAMINATION OF RELATED FACTORS IN WINNIPEG

The objective of this research is to identify the revitalization process underway (e.g.) incumbent upgrading or gentrification in inner city areas demonstrating a high level of renovation activity. It will identify the factors that lead to neighbourhood decline and, equally, factors that prevent the onset of decline.

CMHC Project Officer : *Fanis Grammenos*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1277 0200001
STATUS : Ongoing Project

RENTAL REPAIR AND RENOVATION IN CANADA

This report presents analysis and data highlights from the Rental Repair and Renovation Expenditure Survey (RRRES). Statistics Canada conducted the RRRES on behalf of Canada Mortgage and Housing Corporation (CMHC). Clayton Research Associates Limited analyzed the information for presentation in this report.

Since 1988, through the Homeowner Repair and Renovation Expenditure Survey (HRRES), Statistics Canada has provided annual information on repair and renovation work undertaken by homeowners. However, no comparable information was available for rental units. The main objective of the RRRES, therefore, was to fill this information gap by collecting information on the expenditures made by landlords on repairs and renovations to rental units. The survey covered only private rental units; public housing units were excluded. As well, the survey excludes spending by tenants on rental units.

Respondents were asked to report repair and renovation expenditures (both costs of materials, and contracted work) for the following types of work: additions, renovations and alterations; replacement of equipment; new installations; repairs and maintenance. The RRRES also collected information on housekeeping costs.

In addition to an introduction, the report contains two main sections:

- "Highlights" summarizes key survey results from the RRRES.

- "Comparison to Homeowner Repair and Renovation Spending" compares the estimates of spending on private rental units with estimates for the ownership units from the HRRES.

In addition to the main report, the report contains three appendices:

- Appendix A reproduces the Labour Force Survey Contact Information Form, which was used to screen participants, and the Rental Repair and Renovation Expenditure Survey questionnaire.

- Appendix B discusses the survey methodology in more detail.

- Appendix C presents detailed tabulations for figures in the main report. These include data on the incidence of repair and renovation spending and the average spending per unit by type of work, region, structural type of building and period of construction.

Prepared by: Clayton Research Associates Limited. Project Manager: Patricia Arsenault. Prepared for: Canada Mortgage and Housing Corporation. CMHC Project Manager: Roger Lewis. Ottawa: CMHC, 1998. (Housing Affordability and Finance Series Research Report)

Order number: PE0316 **Price: $12.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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International clients see page 9 for order instructions.

FEASIBILITY OF CREATING A CANADIAN MULTIPLE-UNIT RENTAL HOUSING DATA BASE

The objective of this project is to assess the feasibility of developing a Canadian multiple-unit rental housing database. To that end, the following four questions will be addressed: (i) Should CMHC initiate the development of a multiple-unit data base? (ii) What opportunities would there be to partner with other organizations? (iii) Should a Canadian initiative be linked in some way with the U.S. effort being managed by the Multifamily Housing Institute? and, (iv) What are the options for proceeding?

CMHC Project Officer : *David Scherlowski*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2095 0200
STATUS : Ongoing Project

HOUSING HELP RENT BANK PILOT PROJECT EVALUATION

This project will document and evaluate the Housing Help Rent Bank pilot project in Toronto which provides mediation, relocation, counselling services and rent loans to women and children who are at risk of eviction from housing which is affordable, permanent and habitable.

CMHC Project Officer : *Anna Lenk*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2091 0200001
STATUS : Ongoing Project

RENTERS AND THEIR HOUSING CONDITIONS: FROM THE 1980s INTO THE 1990s

The purpose of this project is to examine how and why the circumstance of renter households changed over the last fifteen years, with special focus on housing conditions, and the social and economic factors associated with changes in the level and nature of housing need.

CMHC Project Officer : *John Engeland*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1582 0200001
STATUS : Ongoing Project

REVIEW OF METHODS GOVERNMENTS HAVE EMPLOYED TO SUPPORT PRIVATE RENTAL HOUSING

In the current fiscal environment, the federal and provincial governments have limited resources to use in directly supporting the availability of affordable rental housing and must rely on the private sector to achieve this objective. As part of CMHC's efforts to enhance and broaden the understanding of rental housing, this project examines alternative programs and policies employed by governments internationally to support private rental housing, particularly those programs and policies intended to improve the quality, prolong the life or increase the supply of such housing. The review encompassed initiatives from the U.S., U.K., Western Europe, Scandinavian countries, Australia and Japan. This project will be of interest to property developers, private rental landlords and investors, the construction and renovation industry, mortgage lenders and insurers as well as federal and provincial housing policy analysts.

CMHC Project Officer : *David Metzak*

Division : *Research Division*

AVAILABILITY : *Publication is not available*

CIDN : 1885 0200001

STATUS : Ongoing Project

UNDERSTANDING PRIVATE RENTAL HOUSING INVESTMENT IN CANADA

The key study objectives were:

- To examine the nature and extent of private rental housing investment in Canada;

- To develop a profile of who is investing in private rental housing; and

- To establish a thorough understanding of what investors and lenders consider in their decision-making process.

The ultimate goal of the research was to provide a solid basis from which public and private sector decision-makers can act in an informed manner.

Rental housing can be divided into two broad sectors:

- Private rental housing refers to units owned by private sector investors; the owner or occupants may have received a government subsidy/incentive at some point, but the units themselves remain in the hands of the private sector.

- Social/assisted rental housing includes any publicly owned rental building, including non-profit and co-op buildings.

It is private rental housing which forms the focus of the current study.

Investment in private rental housing can take a variety of forms, including:

- Developing new "purpose-built" rental properties for own portfolio or for sale to other investors;

- Purchasing rental properties from a previous investor (or developer);

- Holding/owning existing rental properties on an on-going, longer-term basis;

- Converting purpose-built owner-occupied or non-residential space to rental tenure - either temporarily or permanently; and

- Upgrading existing rental properties (i.e. renovation/repair work).

This report covers each of these various types of private rental investment to some degree. However, the emphasis of the analysis, particularly with respect to the development of a profile of rental investors, is on what are termed "active" investors - those who invest in new units, or are purchasing existing units.

The study takes a Canada-wide view of private rental investment. Where available, statistical information is presented for the 26 Census Metropolitan Areas (CMAs). In addition, the following

6 major markets have been selected for more in-depth analysis in some instances: Halifax; Montreal; Toronto; Winnipeg; Calgary; Vancouver. These centres were chosen as they are among the largest rental markets, and also provide for a degree of geographic variation.

Prepared by Clayton Research Associates Limited and Fish Marks Jenkins Real Estate Consulting. Ottawa: Canada Mortgage and Housing Corporation, c1999. (Housing Affordability and Finance Series Research Report)

Order number: PE0335 **Price: $12.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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RESIDENTIAL DEVELOPMENT

ALTERNATIVE PLANNING AND REGULATORY APPROACHES USED IN OTHER COUNTRIES

This study examined international approaches to planning and development regulation, specifically, the use of performance based planning and financial/economic incentives. These approaches provide useful lessons and insights in improving the flexibility and effectiveness of the development environment in Canada. In addition to summarizing existing literature on the topic, the research includes the results of interviews with government, development and academic informants in Australia, New Zealand, the United States and Europe.

CMHC Project Officer : *Steve Mennill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1775 0200001
STATUS : Ongoing Project

COMMUNITY DESIGN: AN ANALYSIS OF DENSITY MEANINGS AND DEVELOPMENT OF A DESIGN TOOL

This research addresses how Land Use Density stipulations can impact and/or interplay with various other system components (such as open space) of community plan-making. It will result in a Sustainable Community Design Tool component that will inform the process of "negotiated urban design" in arriving at midrange density prototypes acceptable to the broad community.

CMHC Project Officer : *Doug Pollard* — *CIDN : 1998 0200001*

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

CRITICAL SUCCESS FACTORS ENABLING ALTERNATIVE RESIDENTIAL DEVELOPMENT STANDARDS

The purpose of this project is to study innovative examples of the application of alternative development standards. It will determine what the critical success factors are to enable the new standards to be implemented.

CMHC Project Officer : *Doug Pollard* — *CIDN : 2006 020001*

Division : *External Research Program* — *STATUS : Ongoing Project*

Research Division

AVAILABILITY : *Publication is not available*

ECONOMIC IMPACT OF ANCILLARY HOUSING EXPENDITURES

This study will estimate economic impacts from ancillary forms of economic activity such as financing, transfer of ownership, land development and servicing. The contractor will provide estimates of direct, indirect and induced impacts on aggregate and sectoral employment and GDP from ancillary expenditures associated with residential construction expenditures, sales of newly-constructed dwellings and sales of existing dwellings.

CMHC Project Officer : *Orlando Manti* — *CIDN : 2141 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

ECONOMIC IMPACT OF SECONDARY SUITES ON URBAN INFRASTRUCTURE AND SERVICES

The purpose of this research is to investigate and summarize different approaches for determining the municipal servicing costs, both capital and operating, of secondary suites in established neighbourhoods and new subdivisions, through a literature review and key interviews.

CMHC Project Officer : *Steve Mennill*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2010 0200001
STATUS : Ongoing Project

GROW-AS-YOU-GO: A PROGRESSIVE APPROACH TO HOUSING DEVELOPMENT

This study will elaborate and validate a conceptual approach to progressive, or incremental housing development, in order to facilitate the implementation of a concrete demonstration project. The project will summarize the experience of precedents of growth-housing; do an assessment of the number of low income households that could benefit from this approach; determine what regulations would enable its implementation; apply the concept to sites identified by the City of Toronto; and report on the experience of implementation. Publication is expected in the spring of 2000.

CMHC Project Officer : *Fanis Grammenos*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200013
STATUS : Ongoing Project

INFORMATION REVOLUTION AND RESIDENTIAL DEVELOPMENT

The objective of this research is to examine residential development within the context of the information revolution.

CMHC Project Officer : *Susan Fisher*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2014 0200001
STATUS : Ongoing Project

INTENSIFICATION IN URBAN AREAS

This report examines the issue of urban intensification in order to deal with population growth pressures and sprawl. Intensification (also referred to as revitalization or re-urbanization) is a counter-sprawl concept intended to slow the trend toward rampant development of greenfield sites on the urban fringe. Recent studies have found that an intensified development form could result in at least 25% reduction in infrastructure costs and a 40% savings in land consumption. Canadian cities need to encourage mixed-use intensification -- including both new jobs and new housing -- in order to assure efficient public transit, to accommodate changing populations, and to ensure sufficient jobs and population to maintain vibrant urban centres.

Computer visualization is employed in this study to project (in "picture" form) the size, shape, location and appearance of proposed developments and their associated density implications. This technology, which combines geographic information systems and computer-aided design software, is used to illustrate the impacts of intensification on neighbourhoods and the potential visual effects of projects that have not yet been built.

This report demonstrates that:

- Residential and mixed-use intensification is already occurring in some Canadian cities;
- Infill and intensification may be (and have been) effectively employed to increase the stock of affordable housing and to revitalize urban centres; and
- Governments and housing providers must re-think the basis for regulatory controls, rigid building and zoning codes, as well as planning mechanisms which impede the production of low-cost housing;
- Intensification has been achieved by a variety of measures; these include design guidelines in lieu of outdated zoning controls, as-of-right zoning to reduce time delays and processing costs, live/work spaces to promote the provision of both residences and jobs in the city, and the use of density bonuses to encourage concentrated development in key locations (such as transit nodes on major arterials) where revitalization is desirable.

Prepared by Gerald Daly, Richard Milgrom. CMHC Project Officer: Fanis Grammenos. Ottawa: Canada Mortgage and Housing Corporation, 1998. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
Canada Mortgage and Housing Corporation
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RESIDENTIAL INTENSIFICATION IN CENTRAL DISTRICTS

The objective of this research is to examine the phenomenon of residential intensification in a dense urban sector using data on the new housing built there in the last five years and on the new residents of those dwellings. The study will focus on the Mile End neighbourhood of Montreal with the view to drawing lessons for the renewal of central districts in other Canadian cities.

CMHC Project Officer : *Mark Holzman*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 2012 0200001
STATUS : Ongoing Project

RESIDENTIAL STREET DESIGN: LEARNING FROM SUBURBIA

The purpose of this research project is to generate concrete residential street design solutions based upon a thorough understanding of precedents, and to introduce and stimulate new ideas for land developers and design professionals.

CMHC Project Officer : *Fanis Grammenos*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1644 0200001
STATUS : Ongoing Project

GREENBACKS FROM GREEN ROOFS: FORGING A NEW INDUSTRY IN CANADA

The purpose of this study is to review the benefits of green roofs and vertical gardens, examine barriers to diffusion of technologies in Canada and recommend ways to overcome those barriers.

Green roof and vertical garden technologies offer an outstanding number of public and private benefits including: energy cost savings from increased insulation; increased property values; savings on stormwater infrastructure; air quality improvements; and enhanced aesthetic, health and recreational opportunities.

Barriers to the diffusion of these technologies include: lack of knowledge and awareness; lack of incentives; cost barriers; technical issues; and risks associated with uncertainty. These barriers can be overcome by: compiling a repository of knowledge on the Internet; high profile demonstration projects; government procurement support; government policy and program support; financial incentives such as insurance premium reductions and performance based contracting; and research to address information gaps.

Prepared by Steven W. Peck, Chris Callaghan, Brad Bass, and Monica E. Kuhn. CMHC Project Officer: Susan Fisher. Ottawa: Canada Mortgage and Housing Corporation, 1999. (External Research Program)

STATUS : *Completed Report*

AVAILABILITY : *Canadian Housing Information Centre*
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HOUSING FOR OLDER CANADIANS: THE DEFINITIVE GUIDE TO THE OVER-55 MARKET

Canada's older market - 55 and older - is healthier, more active, more informed, more affluent and more demanding than ever before. "Housing for Older Canadians" is the definitive guide for individuals and organizations who want to design, develop, market, manage and sponsor housing for the "over-55" market. Parts of this book will also be useful for support-service providers and for organizations representing older people and who want to help their members find appropriate housing solutions. The guide is tailored to Canadians, and draws on experiences from Canada and other countries, such as the United States.

Ottawa: Canada Mortgage and Housing Corporation, 1999.

*Order number: NE2184 **Price: $49.95 + GST and handling charges.*

STATUS *: Completed Report*

AVAILABILITY : *CMHC Information Products*
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HOUSING OPTIONS FOR PEOPLE WITH DEMENTIA

One disease that can affect older people is dementia. This is a term used for a group of symptoms that affect mental abilities, including: the ability to remember, reason, make decisions, judge and communicate. There are various forms of dementia: the effects of some can be reversed; those of others, currently, cannot. For those people with a progressive type of dementia, specialized care in specialized environments is required to enhance their abilities and quality of life.

This guide sets out to increase public awareness of new housing options for people with dementia and to encourage the development of more community-based solutions. More specifically:

- it describes a range of housing options designed to meet the particular needs of people with dementia;
- it outlines a range of support services that can help caregivers to fulfil their responsibilities;
- it discusses a number of housing management principles that can help in the care of people with dementia; and
- it discusses environmental design considerations for housing people with dementia.

One of the important concepts presented in this guide is that of "residentiality". Very simply, this concerns the importance of creating a home-like setting for those suffering from dementia. The guide discusses two primary options for those suffering from dementia - to remain at home (whether that is a detached suburban bungalow, a condominium apartment or a dwelling unit in a retirement community), or to move into housing specifically designed for people with dementia. For those who can no longer remain at home, the guide presents a number of housing options where persons with dementia can maintain a comfortable sense of living normally.

Ottawa: Canada Mortgage and Housing Corporation, 1999.

*Order number: NE2214 **Price: $24.95 + GST and handling charges.*

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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IMPORTANCE DU RISQUE ENVIRONNEMENTAL DOMICILIAIRE DANS LA SURVENUE DES CHUTES CHEZ LES PERSONNES ÂGÉES

Research done in recent years has shown that falls by the elderly are not due to chance and are attributable to a combination of factors pertaining to their physical and psychological state, their behaviour and their physical environment. Contrary to intrinsic factors, the environmental component in the risk of falls, though frequently cited as a contributing cause, has been investigated far less. According to studies published in the past twenty years, it has been estimated that the physical environment accounts for close to one half of the falls which occur in the home. The establishment of an environmental risk level pertaining to elders represents a crucial point in preventing falls. In this study, four objectives were pursued:

- List in order the environmental risk factors which relate to falls based on the opinions of a group of experts;
- Determine the level of environmental risk encountered on a daily basis by the elderly living in their homes;
- Identify high-risk sectors in homes;
- Estimate the correlation between the level of environmental risk and the occurrence of falls.

This study examined residents in the Quebec urban region 65 and over, who are autonomous, active and living in their homes. To ensure a homogeneous sample, participants in the study did not require help to move about (walkers and wheelchairs). Two hundred and eleven appointments were scheduled and 192 visits were made between July 21 and October 6, 1997. The information was essentially collected from two measuring instruments completed by interviewers when they visited, i.e., a checklist of environmental risk elements and a questionnaire dealing with the respondent's characteristics (sociodemographic data, whether they have fallen and their history of falling, the level of activity in the home).

Using a linear measuring scale, a group of experts listed in order the various environmental risk factors. This group consisted of 24 persons and covered three specific areas of interest - health, architecture and retired persons. The respondent had to rate each risk factor by choosing a figure on a linear scale to indicate the importance of the factor.

Prepared by Benoît Lévesque, Isabelle Lamontagne, Pierre Maurice, René Verreault, Suzanne Gingras and Denis Gauvin. CMHC Project Officer: Luis Rodriguez. Ottawa: Canada Mortgage and Housing Corporation 1999. (External Research Program)

STATUS : *Completed Report*

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INTERVENTION MODELS: SAFETY IN CASES OF EMERGENCY OF PERSONS WITH REDUCED MOBILITY AND SENIORS LOSING THEIR INDEPENDENCE LIVING IN REGULAR RESIDENTIAL ENVIRONMENTS

This study is aimed at integrating current knowledge and reflections concerning the problems associated with the safety of seniors and persons with disabilities living in regular residential environments, in order to apply them to the development of intervention models for three multiple-family buildings equipped with elevators.

CMHC Project Officer : *Luis Rodriguez*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1460 0200001
STATUS : Ongoing Project

LIVING AT HOME OR IN A RESIDENCE: A CHALLENGE FOR SENIORS AND WORKERS

The objective of this project is to examine, in Quebec's Saguenay area, the circumstances, constraints, limitations and difficulties encountered by clients who receive home care and the organizations that provide it.

CMHC Project Officer : *Luis Rodriguez*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1641 0200001
STATUS : Ongoing Project

MEETING SENIORS' HOUSING NEEDS: A GUIDE FOR COMMUNITY GROUPS

The purpose of this guide is to help organizations, such as service clubs, religious organizations, ethnic organizations, neighbourhood groups and retiree organizations, to understand how they can influence the provision of seniors' housing in their communities.

CMHC Project Officer : *Steve Mennill*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1747 0200001
STATUS : Ongoing Project

PLANNING HOUSING AND SUPPORT SERVICES FOR SENIORS

In 1991, Canada Mortgage and Housing Corporation (CMHC) published Maintaining Senior's Independence in Rural Areas: A Guide to Planning for Housing and Support Services. It was intended to assist rural communities in determining seniors' needs and preferences for housing and support services, and to identify options for meeting them. The publication was based on the results of a study carried out for CMHC's Research Division by Dr. Gerald Hodge and Dr. Gloria Gutman of the Gerontology Research Centre at Simon Fraser University.

Soon after the publication's release, it became evident that it was being used widely across Canada in both rural and urban communities, by people representing a variety of disciplines in the public, non-profit and private sectors. The feedback these users have provided over the past seven years has resulted in a number of improvements to this new edition.

These include modifying the major survey instruments; developing a new section on ways of selecting sample surveys; replacing the section that deals with population data; and complementing the manual tally book with a computerized tallying program. In addition, the focus of the guide has changed to include discussions and considerations that reflect the needs of users in urban as well as rural areas.

This publication was designed to help communities anticipate and plan for the present and future housing needs of seniors while incurring minimal expenses. The publication:

- Provides general information on the aging process in Canada;
- Provides an information model and complete instructions for assessing the housing and support service needs;
- Contains questionnaires, worksheets and reporting forms to gather and analyse facts, as well as step by step instructions for their use.

A computerized version of this guide is available from CMHC under the title SENIORS. It comprises a set of instructions; a set of survey instruments; and a set of analytical routines to facilitate analyses and planning, as well as routines to facilitate reporting. Other features include the ability to export data for transfer to a regional centre for aggregation with data from other community studies, and the ability to combine data at a regional level. SENIORS also contains a built-in population file by age group and sex that is customized for specific communities across Canada.

Ottawa: Canada Mortgage and Housing Corporation, 1999.

*Order number: NE2014 **Price: $44.95 + GST and handling charges.*

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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PREDICTING THE ADJUSTMENT OF ELDERLY PERSONS TO CONGREGATE CARE HOUSING

The objective of this research was to develop a preliminary model for predicting how older people would adjust to congregate housing.

CMHC Project Officer : *Luis Rodriguez*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1827 0200001
STATUS : Ongoing Project

PRIVATE RENTAL MARKET: ADAPTING TO THE NEEDS OF AGING TENANTS

This research will identify the extent to which landlords in the private rental market across Canada are accommodating the needs of aging tenants, and describe and develop measures that would help landlords deal more effectively with tenant needs.

CMHC Project Officer : *Luis Rodriguez*
Division : *External Research Program*
Research Division
AVAILABILITY : *Publication is not available*

CIDN : 1996 0200001
STATUS : Ongoing Project

STUDY OF SPATIAL ORIENTATION IN A RESIDENTIAL COMPLEX FOR SENIORS WITH OR WITHOUT COGNITIVE DISORDERS

The general purpose of this research project is to obtain spatial orientation design criteria that will make it possible to work on the architectural environment of residential complexes for seniors. The analysis concerns three typical residential complexes.

CMHC Project Officer : *Luis Rodriguez*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2144 0200017
STATUS : Ongoing Project

SENIORS

SUPPORTIVE HOUSING FOR SENIORS

The objective of this project is to undertake research and develop the manuscript of a new CMHC publication on supportive housing for seniors. This housing option is increasingly important to fulfill the demand for housing with on-site or readily accessible social and medical support services.

CMHC Project Officer : *Luis Rodriguez* — *CIDN : 2103 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

USER SATISFACTION STUDY OF HOUSING OPTIONS FOR OLDER CANADIANS

The objective of this research is to carry out user satisfaction studies of some of the newer housing options that are currently available to older Canadians, and to produce an objective and detailed report based on the results of the research.

CMHC Project Officer : *Luis Rodriguez* — *CIDN : 1583 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

MEASURING STICK: SOCIAL SUSTAINABILITY IN MULTI-UNIT HOUSING

This project will develop indicators that will measure the quality of life as it is affected by features of housing in three different multi-unit urban neighborhoods. These indicators will be then used to design and test a survey instrument aimed at capturing the social and physical attributes of housing as they pertain to sustainable urban communities.

CMHC Project Officer : *David Scherlowski* — *CIDN : 2144 0200003*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

MULTIPLE HOUSING FOR COMMUNITY SUSTAINABILITY

This project produced information to assist developers and municipalities in developing land at higher than current average densities by means of multiple housing forms. It assembled and developed exemplary multiple housing solutions and assessed consumer demand for these. It also identified market segments and strategies to attract them to medium density housing. The report provides advice on the likely clients for medium density, multiple housing and on project design attributes that will entice them to choose medium density (townhouses and walk up apartments) over single detached housing.

CMHC Project Officer : *Fanis Grammenos* — *CIDN : 1628 0300001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

SUSTAINABLE COMMUNITY INDICATORS PROGRAM (SCIP) SOFTWARE

The objective of this project is to develop a computer software program designed to assist communities in developing and using indicators to measure their progress toward community sustainability. The sustainable community indicators program (SCIP) software is aimed at helping communities to: select, create and use indicators for monitoring and reporting on local sustainability; promote the use of comparable indicators both locally and at the national level; and exchange indicators and related data with other communities.

CMHC Project Officer : *John Engeland* — *CIDN : 1796 0200003*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

URBAN TRANSPORTATION

DESIGN GUIDELINES FOR REGIONAL ROAD CORRIDORS

The purpose of the study is to develop new guidelines to encourage regional road corridors that are safe and easy to access for pedestrians and that are pleasant places for neighbourhood interaction. These corridors should function as public spaces that link communities and enhance living conditions for households within those communities.

CMHC Project Officer : *Susan Fisher* — *CIDN : 2203 0200001*

Division : *Research Division* — *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

IMPACT OF URBAN FORM AND TRAVEL ACCESSIBILITY ON PRIVATE VEHICLE USE

The purpose of this study is to measure the influence of land use patterns and urban form on household travel demand and behaviour. Using household travel survey data from the City of Edmonton, multiple regression analyses were conducted to examine the influence of factors such as: household income and size; accessibility measures by walk, cycle, transit and auto; density and road patterns.

CMHC Project Officer : *Susan Fisher*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 1752 0200001
STATUS : Ongoing Project

METHODOLOGY TO ASSESS TRANSPORTATION GREENHOUSE GAS EMISSIONS FROM URBAN TRAVEL

The purpose of this study is to compare the greenhouse gas (GHG) emissions from personal urban transportation given variations in community planning and design variables such as density and land use mix. The final product will be a software tool that would be used by CMHC and its clients to evaluate development proposals for GHG emissions from urban travel. In the study, the software is used to compare the GHGs from urban travel of nine neighbourhood scenarios, each with different design features and locations.

CMHC Project Officer : *Susan Fisher*
Division : *Research Division*
AVAILABILITY : *Publication is not available*

CIDN : 2041 0200001
STATUS : Ongoing Project

CANADIAN WOMEN AND THEIR HOUSING: 1997

The specific objective of this research study is to provide a profile and analysis of women, health and well-being related to housing issues in the 1990s. This report, building on and updating a 1983 report Women as Housing Consumers, is intended to provide information for use by academics, students, researchers, planners and housing policy-makers at municipal, provincial, and federal levels, and women generally. The study is also intended to suggest future directions for research, policy and dialogue with regards to healthy housing for women.

Prepared by: SPR Associates Inc. Prepared for Canada Mortgage and Housing Corporation. Ottawa: CMHC, 1998.(Housing Choices Series.)

Order Number PEO313 ** Price $12.95 + GST and handling charges.

STATUS : *Completed Report*

AVAILABILITY : *CMHC Information Products*
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INVESTIGATION OF ISSUES FOR THE EVALUATION OF THE NEXT STEP PROGRAM

The purpose of this project is to conduct a literature review on second-stage housing for the Next Step Program.

CMHC Project Officer : *Patricia Streich*
Division : *Audit and Program Evaluation Services*
AVAILABILITY : *Publication is not available*

CIDN : 1507 0500001
STATUS : Ongoing Project

HOUSING CANADA'S YOUTH

The objective of this project is to develop social, economic, and demographic profiles of youth with an in-depth review of their current and past housing conditions, and identification and assessment of housing issues and trends into the future. The youth and rental repair studies should be out by the end of the year.

CMHC Project Officer : *Gloria Neufeld Redekop* *CIDN : 1786 0200001*

Division : *Research Division* *STATUS : Ongoing Project*

AVAILABILITY : *Publication is not available*

Alternative mortgage instruments / Nouveaux modes de financement hypothécaire

(Rev. 15 p., October/octobre 1984)

Architecture in Canada / L'architecture du Canada

(18 p., July/juillet 1983)

Building and climatic factors / Construction et des éléments climatiques

(7 p., November/novembre 1983)

Building in cold climates / Construction dans les pays froids

(Rev. 9p., December/décembre 1989)

Building laws / Législation de la construction

(Rev. 25 p., October/octobre 1986)

Building materials / Matériaux de construction

(14 p., August/août 1987)

Building product information / Information sur les produits pour le bâtiment

(7 p., August/août 1984)

Children in the urban environment / Les enfants dans le milieu urbain

(23 p., January/janvier 1993)

Cohousing /Habitation communautaire

(8p., July/juillet 1996)

Computer-aided architectural design / Dessins architecturaux par ordinateur

(Rev. 2 p., September/septembre 1984)

Condominium conversion / Immeubles d'habitation - transformation en copropriétés

(12 p., May/mai 1986)

Condominiums / Copropriétés

(Rev. 12 p., March/mars 1986)

Congregate housing / Habitat collectif

(10 p., November/novembre 1991)

Construction industry in Canada / Industrie de la construction au Canada

(Rev. 27 p., January/janvier 1988)

Construction industry labour / Main-d'oeuvre de la construction

(6 p., February/février 1988)

Cooperative housing / Coopératives de logements

(Rev. 40 p., September/septembre 1988)

Crime prevention and architectural design / Design architectural et prévention de la criminalité
(7 p., May/mai 1989)

Crime prevention and urban safety in residential environments / La prévention du crime et la sécurité dans les milieux résidentiels

(12p., September/septembre 1989)

Deinstitutionalization

(7 p., June/juin 1988)

Desktop Publishing

(3 p., March/mars 1988)

Development rights transfer / Transfert de droits de développement

(8p., December/décembre 1985)

Discrimination and segregation in housing in Canada / Bibliographie sur la discrimination et la ségrégation dans le logement au Canada

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